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VOL. XII. JULY, 1919. PART 1.

Agriculture.

CASTOR OIL BEAN.

Mr. H. Ross, Chief Inspector of Agriculture, New South Wales, writes on the advantages and disadvantages of the cultivation of the Castor plant as a commercial proposition as follows:—

IS CASTOR BEAN PRODUCTION PAYABLE?

To answer this question it has to be borne in mind that countries in which cheap labour is available are the principal producers; therefore, the question of exporting our surplus crop is one which cannot be regarded seriously, and to satisfy the local demand must be the one aim of the would-be producer.

The following questions naturally present themselves:—

1. What is the demand for castor beans?
2. How many bushels per acre is a fair yield?
3. What is the probable price per bushel?
4. What is the cost of production, including rent of land, seed cultivation, harvesting, and marketing?

The answers are:—

1. The demand is a limited one; assuming 100,000 gallons to be sufficient for New South Wales requirements, about 3,500 acres under this crop will supply this demand.
2. Not more than 20 bushels per acre can be expected, although yields of 30 and even 40 bushels per acre are recorded from Florida, South Carolina, Georgia, Texas, and California.

The Queensland Department of Agriculture, in the July issue of the "Queensland Agricultural Journal," states that the average yield is about 20 bushels per acre.

3. The price per bushel can hardly be estimated, in so far that no market has been established in the past for beans in Australia.

The War Department of Washington, U.S.A., has let contracts for the supply of beans at 3.50 dollars (approximately 14s.) per bushel of 46 lb. This, it must be remembered, is during War time, when an unprecedented demand has set in for castor oil for aeroplanes, and it is not likely that these prices can be maintained.

Quoting from an article in the "Country Gentleman" (U.S.A.) for March, 1918, contributed by E. B. Reid, it is stated that "in recent times prices to farmers have fluctuated widely by localities and years, ranging from 1 to 2 dollars a bushel, with possibly 1 dollar to 1¼ dollar about the average."

Further evidence is available as to price in an article on castor seed published in the "Bulletin of the Imperial Institute," 1911. The writer states that specimens were submitted to commercial experts, who valued them as follows:—

	£ s. d.	
Nos. 1, 3, 4, 6	9 17 6	per ton, March, 1909.
„ 5, 7	9 10 0	„ „ „
„ 2	9 0 0	„ „ „
„ 8	8 10 0	„ „ „
„ 9	13 5 0	„ October, 1910.

net weight, including bags, delivered free ex ship "Hull," less 2½ per cent. discount.

Taking the American and English figures as a guide, we see then that the price in 1909 was somewhere about 4s., and in 1910 in the vicinity of 5s. 4d. per bushel.

4. The cost of production can only be arrived at according to locality; it would be somewhat similar to the cost of producing an acre of maize except that the harvesting is much more expensive. This is accounted for by the fact that the pods do not ripen evenly and the crop has to be gone over several times in order to harvest it. An estimate for producing, harvesting, bagging, and marketing a 20-bushel crop of castor beans, allowing 10s. per annum for rent, would not be less than £5 per acre.

From the above figures, farmers will be able to draw their own conclusion as to whether this crop can be considered payable. Furthermore, it may be stated that castor oil plants cannot be grown continuously on the same land for any lengthy period, because the crop exhausts the soil rapidly; so much so that some authorities state that it should be grown only once in five or six years on the same land.

In India the castor bean is usually not grown as a pure crop—that is, it is not grown by itself, but is grown as a border to either a cotton or some other crop, being frequently mixed with a cereal or a legume crop.

The castor oil plant has been proclaimed a noxious weed in many shires and municipalities of this State, and before it can be cultivated in these districts, the restriction would have to be removed.

METHODS OF CULTIVATION.

For the benefit of farmers who wish to try this crop the following information regarding cultivation, harvesting, &c., is given:—

Climate.—A tropical or sub-tropical climate is best suited for the production of castor beans, the North Coast being particularly suitable.

Soil.—A good loamy soil such as is suited for maize-growing is best, although fair results may be obtained from poorer soils. Heavy clay soils, especially those which are wet and sour, are unsuitable.

Sowing.—The seed should be sown in spring when all danger of frost is over, on well prepared land, in hills, 6 or 7 ft. apart in the rows, and from 6 to 8 ft. apart between the rows. Three seeds are planted in each hill and covered to a depth of 2 to 3 in. It is advisable to pour hot (not boiling) water over the seed prior to planting and let them steep for twenty-four hours.

Thinning out.—When the plants are from 6 to 8 in. high the two smaller ones should be removed from each hill, leaving the strongest.

Intertillage.—It is necessary to cultivate between the rows in order to keep down all weed growth. The intertillage should be similar to that given to a maize crop.

Pinching back.—If the plants are allowed to grow without check they will frequently attain a height of from 15 to 20 ft., thus making the harvesting of the seed very inconvenient. In order to keep the plants at a convenient height, the main stem should be pinched back.

Experiments are being conducted on the Grafton and Wollongbar Experiment Farms, also in several localities on the North Coast; and until the results from these experiments are to hand, farmers who wish to give this crop a trial are advised to do so only on a very small scale.

PERCENTAGE OF OIL.

The "Bulletin of the Imperial Institute" (1911) gives the result of nine samples submitted for examination:—

No. of Sample.	Yield of Oil.	No. of Sample.	Yield of Oil.
	Per cent.		Per cent.
1	48·0	6	48·9
2	50·8	7	47·6
3	49·4	8	45·8
4	47·8	9	48·2
5	50·0		

A sample obtained from Queensland was analysed by the Chemist's Branch of this Department, and Mr. Guthrie reports as follows:—

Husk	.. ..	24.63 per cent.
Kernel	.. ..	75.37 ,,

The yield of oil from the kernel was 55.41 per cent. corresponding to a yield of 41.76 per cent. of the whole bean.

The oil was obtained by extraction with sulphuric acid.

HARVESTING SEED.

It is here where most of the difficulties in connection with this crop will be encountered. The seed does not all ripen at the same time. When nearly ripe the capsules begin to turn brown, and it is then that the "spikes" should be harvested. If left, seed shoots out of the capsule. The spikes ripen at irregular intervals, necessitating going over the crop several times before the seed is harvested. Cutting the spikes has to be done by hand; immediately they are cut they should be carted to the barn and spread out, preferably on a wooden or a hardset earthen floor, surrounded by sides about 2 feet high; these sides may consist of either wood or bagging. The hot rays of the sun will greatly accelerate thorough ripening. They will need to be turned over with a fork at least once a day until thoroughly ripe, when the seeds will "pop" out. It is this popping of the seeds which necessitates the cut spikes being placed either in a shed or on a floor surrounded by an enclosure.

After the seeds are out of the capsules nothing further remains to be done except to separate the seeds from the husks by winnowing.

It usually takes from four to six days after cutting before the spikes shed their seed.—"Agricultural Gazette" of New South Wales, December, 1918.

COTTON-GROWING AT ESK.

Esk is a thriving agricultural and dairying district, 67 miles by rail from Brisbane. We have received from Mr. W. S. Harding, Inspector of Dairies in that district, the following information concerning the cultivation of cotton there. In the issue of this "Journal" for April last, we published a valuable and interesting paper by Mr. D. Jones, Instructor in Cotton-growing, on the Cotton Industry in Queensland, in which he mentioned the success achieved by Mr. Litzow in the Lowood district (45 miles from Brisbane). This farmer had about an acre of cotton which last year suffered severely from drought, but yet yielded 1,700 lb. of seed cotton. Had the slightest rain fallen during the growing season, the crop would have been very much larger; but, notwithstanding the drought, he obtained £50 for the two crops which he sent to the State Ginnery at the Department of Agriculture, equal to £25 per acre. We are much indebted to Mr. Harding for the following information as to the result of a small plot of 2¼ acres of cotton grown by Mr. Otto Mollenhauer, of Coal Creek, Esk, from seed supplied by the Department of Agriculture. From this plot, 3,406 lb. of raw cotton was gathered, for which he received from the Department £57 5s. 4d., or an average of £25 9s. per acre. This cotton was grown during the late drought, having had scarcely any rain from the time it was planted until picking was commenced. The plot where the crop was grown was on the eastern slope of a very high ridge, the soil being of a gravelly nature, with a clayey subsoil. The bushes were not cut down by the frosts of last winter, but sprouted out again in the spring. As they started to pod early, picking was again started about Christmas, and Mr. Mollenhauer estimates that he will receive as much from this plot as he did for that of last season. He has planted another plot of about 2½ to 3 acres this season, which is doing equally well, if not better.

STACKING GREEN OR WET LUCERNE.

The Director of Agriculture, referring to the statement in the "Producers' Review," that thousands of tons of lucerne were wasted last year during the wet season, states that similar conditions have been noted in Queensland on too many occasions during "years of plenty," which have been, unfortunately, characterised by a prodigal waste of material, unprecedented, perhaps, in any other country in the world.

Farmers can have every confidence in erecting stacks of green succulent lucerne and even in stacking the fodder when wet. A little more than twelve months ago a number of references were made in the Press by the Department *re* conserving lucerne in this way, and officers were sent out to give advice to farmers on methods of stacking. It may be of interest to note that a quantity of lucerne was stacked last year at the Warren State Farm in the Rockhampton District immediately after the floods (the weather being too humid and wet to make hay), and the resultant ensilage (which gave a relatively small percentage of waste) proved invaluable in the winter for the dairy cattle. The fodder was stacked in a framework of poles which were sunk in the ground and bound securely with top plates twitched on to the uprights so as to induce an even settling of the mass, this latter being facilitated by weighting the top with a thick covering of soil heaped up in the centre to turn off the rain.

Work of this character is of course hampered in wet weather where soils are of a sticky nature, but the old adage—"Where there's a will there's a way"—briefly sums up a situation where a little more effort at the right time on the part of the individual would go a long way towards solving a problem of vital moment to our rural community.

This Department is only too ready to give practical advice on the subject through the instructional staff when communicated with by individual farmers.

FLAX-GROWING.

We have received from Mr. H. A. Strain, of Terror's Creek, the following paper on the flax industry. The author has had a life-long experience in all branches of the business, from the field to the factory, in Ireland, and is a strong advocate of the vigorous prosecution of flax-growing in Queensland:—

"According to promise, I will explain in my own way what I know about flax growing and manufacturing up to a certain stage; and I will make it as plain and simple as possible, so that Ulster men in Australia will understand it and try to back up the promoters of one of the greatest industries ever started in Australia.

"In this article I do not propose to say anything concerning the manufacture of flaxen goods. I shall treat of that later on. As regards the cultivation of the plant, the first problem is to ascertain the proper time for saving the seed, which is produced about four months after sowing. Seeing that two crops of potatoes are obtained annually in Queensland, there is no reason why we should not harvest two crops of flax. For the summer crops, July is the most favourable month for sowing, as it will be three months before weeds can do any harm to the plants. Heavy crops of flax can be grown on river and creek flats, in spite of weeds; and experience has shown that it will not pay to have the weeds pulled out by hand.

"In Ulster the farmer has his own family to clean the crop, and it would never pay to give 10s. or 12s. per day to 'slow-go' men for flax-weeding. If the industry is to go ahead in Queensland, it must be on a very large scale; and hand-weeding would be a waste of time and money. But we have millions of acres of new lands as good as any in the world, not far from the coast, where the plant will thrive better than farther inland. I think that the Burnett District would be the premier flax area in Queensland, if not in Australia. Heavy land is not so suitable as lighter soils.

"The second problem we are concerned with is what may be called 'the winter crop.' I am not so sure of the success of this crop; the only chance for it would be to sow the seed no later than from the middle of February to the middle of March. This would secure fully three months' growth, and longer in some cases. When the flower has dropped off I do not consider that frost would do any harm, as the plant has then about done growing. It would scarcely be wise to sow the winter crop in old ground, as it would be the wrong time of year to enable it to get a start on account of weeds. Of course it would be quite a different matter in the case of new ground.

"My neighbour, Mr. Riley, and I intend to solve these problems during the next two seasons. I think it would be encouraging to pioneers of the industry if the Government were to offer a prize for the best sample of flax for linen manufacture at the next Exhibition of the National Association; and I consider it is the bounden duty of every man on the land and in the fibre trade in Australia to assist in every possible way to make flax-growing a success. Few people in Australia have any idea of the vast number of people who would find employment in various ways in connection with successful flax-growing—from the sowing of the seed, and through the various stages of the product, until the web of linen reaches the drapers' shops.

"It is not necessary here to dilate upon the manufacturing processes. Our first work is to prove that we can grow this crop to a profit, and the next to consider the water question; and the latter is a very serious consideration, for, even if we could grow the best flax in the world, we could not produce a readily marketable article unless we had the right class of water, and that is soft stagnant water; otherwise all the work of the grower goes for nothing. The waterhole must be firm, and hold water like a bucket; for, should it soak away whilst the flax is undergoing 'retting,' all is lost labour.

"Taking it all round, I consider that Samson Vale offers the best conditions as regards water. Some growers might have to cart their crop from some distance to the water; but it will well repay them, as in many cases they will realise double the price for their flax. There is a marked difference between flax that the rope-maker buys and a flax for linen web which would require the aid of a strong magnifying glass to count how many hundred threads are contained in one inch of it. There are many places where the needful class of water is plentiful, and others where it is difficult to find it.

"Many industries—such at wheat-growing, fruit culture, dairying, cotton-growing, &c.—are assisted by the Department of Agriculture appointing experts in these industries to point out lands suitable for the various crops, giving demonstrations on the farmers' own lands and on experimental farms to enable men to make a success, when, without this help, they might be working at a loss. A man might be engaged to show intending flax-growers how to proceed at each stage of the crop. It would also be advantageous if each man who sows a plot of flax would take the trouble to make notes of the class of ground sown, the date of sowing, the rainfall from seed-time to harvest, &c., &c., and also obtain an analysis of the soil, which would, later on, be of great value to him. The worst trouble of the agriculturist is the high cost of labour. I am not so much afraid of good wages to good workers as I am of the 'go-slow' variety of field workers, and of strikes.

"As soon as the flax is ready for pulling, it must be pulled and watered as soon as possible, or the fibre will lose a great part of the oil in it, and then, when it is 'scutched,' it will be quite hairy and not fit for fine work. If pulling and watering are not done quickly, a farmer would lose from 2s. to 4s. a stone, and that would amount to a considerable sum on 50 acres of flax. Thus it is easy to imagine what a loss it would be to growers if a general strike were declared just at harvest time. I would, of course, like to see every man getting good, fair wages, so that he could keep his wife and family and himself in comfort and get out on a Sunday, decently clothed, to their place of worship.

"There is a district in Ulster (Ireland) mainly red soil, and there is no better in Ireland for heavy crops and good quality of flax. We have thousands of acres of the same class of soil here on our eastern watershed which would grow good flax sheltered from the westerly wind. There it could be sown early and late. There is a splendid rainfall. It would be well to try a plot or two on Mount Mee, and this would not need a large outlay to find out whether flax would prove a success there or not. It is time to get a move on for the July sowing. Then we shall have breathing time before next March, when we can try the autumn crop. Mr. Riley and I have been trying some seed we got. There is no time to send to Holland for July sowing, but this first lot will give us a little experience. If we are successful, the farmers in a few years would not have to import seed.*

"It would take too long at present to explain the method of treating the crop without injury to the fibre, but I will deal with that later on."

WATERPROOFING CALICO.

The "Farmers' Advocate," South Africa, says that a cheap and effective cover can be made by dipping a piece of unbleached calico, or canvas duck, into paraffin, and while it is wet with the paraffin, painting it with any colour preferred, then leaving it to dry. This cover will not harden or stick together as the ordinary tarpaulin will.

* The Department of Agriculture has not been unmindful of the flax industry. Flax seed has been distributed to many farmers with instructions for sowing and harvesting the crop.—Ed. "Q. A. J."

NITRATE OF SODA SUPPLIES.

A newly constituted body styled the Associated Producers of Chilean Nitrate is now officially selling nitrate of soda at a definitely fixed price delivered alongside ship at Chilean ports.

The price fixed is considerably below that which was ruling during the last year of hostilities, but the landed price here will still depend largely on the freight rate in bringing forward cargoes.

It is understood that negotiations are now proceeding which should assure the arrival in Australia of ample stocks of nitrate of soda in the spring, and although the price is still likely to be considerably higher than in pre-war times as the result of increased cost of production in Chile, as well as of higher freights, still it should be purchasable at an appreciable reduction on that now ruling.—''Agricultural Gazette of New South Wales.''

It is now well known throughout the sugar-growing centres of the world that nitrogenous manures are of outstanding importance in the fertilisation of sugar-cane.

Pastoral.

NEW WOOLLEN COMPANY.

Since the closing down of the Queensland Woollen Manufacturing Company at Ipswich some years ago, Queensland has been dependent on the woollen mills of the Southern States, and to a very large extent on Germany and other countries, for its supplies of woollen goods, yet it is stated that every woollen mill in Australia is a financial success. Had the cotton mill which operated at Ipswich successfully, when cotton-growing appeared to be one of the staple agricultural industries of the State at the time of the Civil War in America, been able to compete with mills in Europe, doubtless the industry would have flourished, and more mills would have been established. Under present conditions of cotton-growing, aided as it is by the Government, there may yet be a flourishing cotton mill established in Southern Queensland.

The prospectus of the Victory Worsted and Woollen Manufacturing Company, Limited, has now been issued under the provisional directorship of Messrs. J. K. Stewart, Daniel Mactaggart, J. H. Hart, George Coxon, F. E. Sturmfels, and Franklin Robinson. The objects of the company are to establish in the vicinity of Brisbane up-to-date worsted and woollen mills for the manufacture of serges, ladies' dress materials, and tweeds, for which there is practically an unlimited market, and to extend its manufactures according to the requirements of its customers. As the Australian woollen companies enjoy a protective import duty and landing charges of over 40 per cent., it will be conceded that the prospects of success for the new company are bright.

Mr. F. Robinson, who has joined the provisional directorate as manager, was manager of the Queensland Woollen Manufactory at Ipswich abovementioned. He is also a member of the State Wool Committee.

ONIONS FOR NERVES.

In a publication entitled ''What to Eat,'' issued somewhere in England in 1903, the following eulogy of the onion appeared:—

''There is nothing, medicinally speaking, so useful in cases of nervous prostration as the poor, humble onion. They are almost the best nervine known, and may be used in coughs, colds, and influenza, in consumption, scurvy, and kindred diseases. White onions overcome sleeplessness, while red ones are an excellent diuretic. Eaten every day, they soon have a whitening effect upon the complexion.

The Horse.

MORE ABOUT THE SUFFOLK PUNCH.

Last month we gave our readers a New Zealander's opinion of the Percheron, of which Norman breed the Suffolk Punch is supposed to be a descendant, but the precise origin of the Suffolk is, like that of most ancient breeds, enshrouded in obscurity; but, at the same time, the antiquity of this horse is absolutely beyond all question. So far back as the year 1720 allusions to the breed in the Suffolk "Ipswich Journal" are so frequent as to render it certain that it was firmly established at that period. Indeed, it is asserted by some that the Suffolks were cultivated as a distinct breed 500 years ago by crossing the old Norman horse with East Anglia mares. Be this as it may, the fact remains that the Suffolks of the present day can boast of pedigrees that extend back as far as 1768, at which period there existed a notable but nameless stallion belonging to one Crisp, a resident of Ufford, near Woodbridge.

In 1908, this breed was introduced for farm purposes by the Department of Agriculture and Stock in Queensland, the first lot having been obtained from Mount Abundance.

Whether the Suffolk Punch will ever reach the position of the most favoured heavy horse is, perhaps, a matter of considerable doubt, but to those who require for their work a fast, active, good-tempered, and good-constitutioned draught horse, there is no gainsaying the fact that they might do far worse for themselves than by giving a chance to the handsome and long-lived Suffolk Punch, whose antiquity alone may commend him to their consideration.

Even as a heavy saddle horse the Suffolk is a treasure. The writer bought a beautiful, nuggety, silver-maned chestnut Suffolk from Mr. White, of Bluff Downs, North Queensland, in 1875. A more powerful, docile horse for a traveller could not be imagined. Fast, he was not; but for endurance he could not be surpassed. The proof of this may be shown that, on one occasion, the writer left the late Mr. William Hann's station at Maryvale (N.Q.) at 6 a.m. to make a station only 40 miles distant. Mr. Hann gave directions for a short cut through the bush; but, as it turned out, "the longest way round would have been the shortest way home," for, after carefully following directions, nightfall found the traveller in a piece of waterless broken country, and during the whole day no water had been found. After a fruitless endeavour to track the footsteps of a shod horse on the bank of a dry gully, it was decided to leave the matter to the horse. He set off at a quick walk, which he never relaxed till 4 a.m. the next morning, when he brought up at the first water on Tara Station, and then trotted gaily on to Maryvale, a journey of nearly 80 miles. At 8 a.m. he started again, this time in company with the mailman, and reached his destination at 6 p.m., making a journey of 120 miles with only a spell of about two hours, and he was as fresh as a daisy on arrival. Next day he was ridden 30 miles to the Etheridge, *viâ* Gilberton, and returned to Townsville, after three days' spell at Georgetown, as lively and in as good condition and temper as if he had only had a day's outing. That horse cost £25, and he was worth £50. Now, here is an account of this breed of horses which must convince anyone that the Suffolk Punch is the horse, *par excellence,* for the farmer, taken from a paper by Mr. A. Jaques,* of Lamerton, Alberta, Manitoba:—

Perhaps, in the eyes of the ordinary visitor to an agricultural show, there is no variety of the so-called heavy horse more attractive than the Suffolk. The breed, moreover, comes as somewhat of a novelty to many persons, for, in spite of the great claims possessed by the Suffolk upon the suffrages of the agriculturist and the townsman, it is still in East Anglia that his merits are most keenly appreciated, and, in fact, the farmers in that part of the country prefer the Suffolk to any other breed of heavy horse.

It is still, however, against the breed that the proportions of a Suffolk do not equal those of a Clydesdale or a Shire horse, many persons being thereby led away into a belief that the east country animals are proportionately weaker than the others; whereas those who are best acquainted with their merits entertain the opinion that,

* Mr. Jaques was a breeder and importer of these horses, and in the past imported direct from England 17 Suffolk Punch horses and 30 Suffolk sheep.

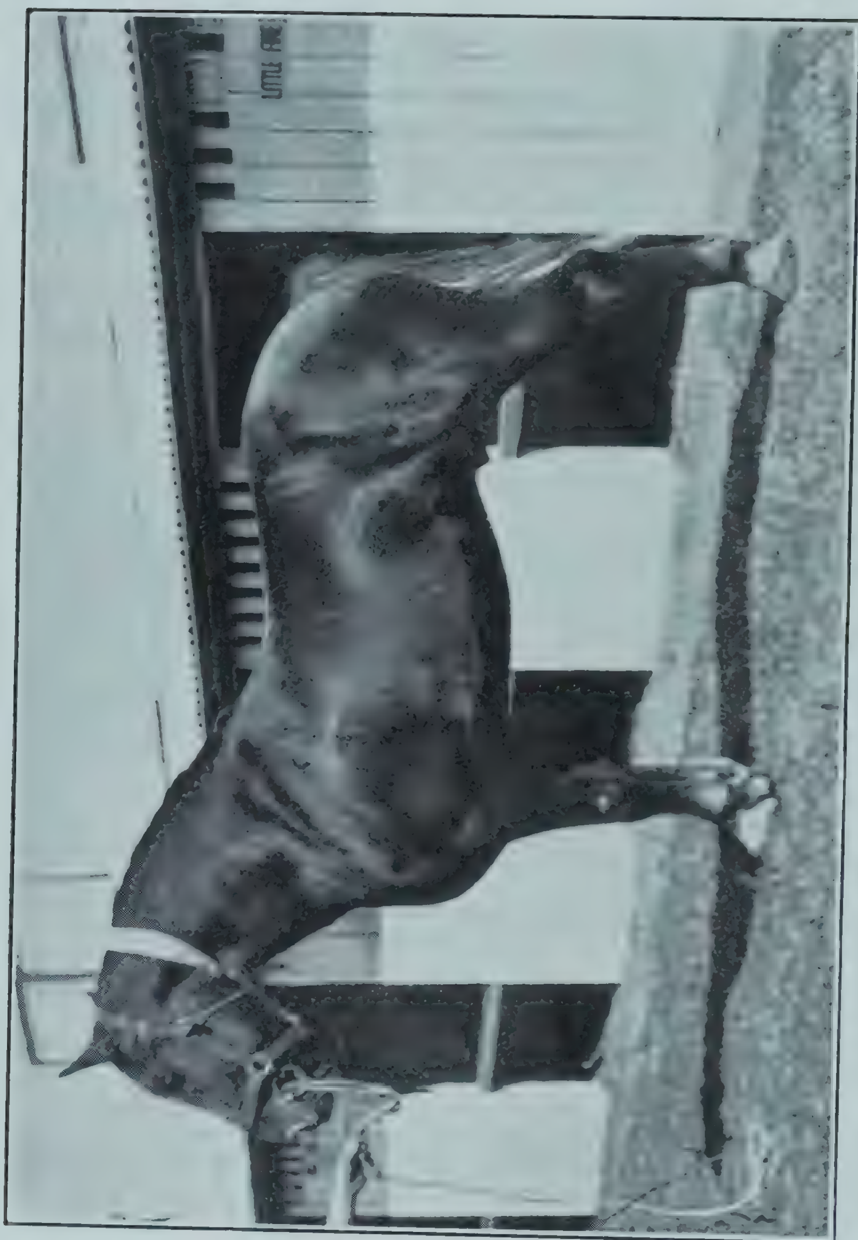


PLATE 1.—CHAMPION SUFFOLK PUNCH STALLION, "GLENTHORNE MONARCH."

considering his height—16 hands 1 in. is the recognised limit of stature in connection with this breed—the Suffolk is quite as powerful an animal as any other breed of horse in existence.

Probably, therefore, if he were better known in Western Canada, the Suffolk would considerably increase the circle of his supporters; but, in the face of the patronage that is now being extended to both Clydesdales and Shires, the development of the Punch will be for a time retarded. Nevertheless, he is holding his ground in many other countries, and is being largely sought after by the Germans, Austrians, and Russians, to be used in their Government studs for the purpose of crossing and getting artillery horses. No doubt this horse has not the weight or power to draw through crowded streets heavy lorries and other such cumbersome vehicles when loaded to their utmost. Such duties lie far more within the province of the Clydesdale or the Shire; but, in front of a plough, with a good man behind it, a pair of Suffolks can get through a day's work that should amply satisfy the requirements of any reasonably-minded agriculturist. Then, too, for the lighter class of goods traffic in towns, the Suffolk is a very suitable horse; he is so much more active than the Clyde or Shire, in addition to being faster than either, that he can get through a day's work in a comparatively light wagon far better than they.

Of course, no colour of coat other than chestnut is admissible in an animal that is desired to enter for the Suffolk Stud Book Association, it being distinctly laid down that, though the shade may vary, there is no place for any horse save chestnuts in the society's official volume.

In addition to colour, the Suffolk is distinguished from the Clydesdale and the Shire horse by the fact that he is a clean-legged animal, and does not possess the extreme amount of feather that is so much sought after by breeders of these varieties. This circumstance may very possibly be accepted as an additional reason for the slowness which has characterised the headway made by the Suffolk in Canada, for it seems that the majority of agriculturists in this country are great advocates of hair and bone, and a general belief prevails that if hair is absent on a heavy horse's legs bone is certain to be deficient likewise. This, however, is not generally accepted by the breeders of Suffolks, who support their contentions by measurements, and assert that their favourite horse—that is, when his height at shoulder and general bulk are taken into consideration—is fully the equal of his heavier rivals as regards the amount of bone he possesses below the knee. As a case in point, Mr. Hume Webster refers to Mr. Alfred J. Smith's champion stallion Wedgwood, who, at the time he wrote, was five years old, and measured 7 ft. 10 in. in girth and 10¾ in. below the knee—a very considerable measurement, when it is remembered that there is no hair included in the dimension given. Wedgwood, it may be stated, was foaled in the year 1886, and was the winner of the championship at the show of the Royal Agricultural Society of England.

The Suffolk, moreover, is credited with a very enviable reputation for being a good horse so far as the soundness of his feet is concerned, and consequently it is claimed for him that he lasts longer upon the stones of a town than any other variety that is put to the same class of work. Longevity, indeed, is one of the chief claims that Suffolk breeders insist upon making for their horses. As an instance, it is stated in the society's stud-book that at one of the exhibitions held by the Suffolk Agricultural Society, a brood mare, aged 37 years, was amongst the competitors, and at that time she was accompanied by a sucking foal. Julian's Boxer travelled as a stallion for twenty-five seasons. The dam of Lofft's Cupbearer, owned by the Rev. O. Reynolds, of Leabeach, was one of the sixteen foals which her owner had bred from her dam in sixteen years, and the mare from which Rising Star, the first prize horse at Leeds in 1861, was bred, was 22 years old when the colt was foaled. These are a few instances of the longevity and vitality of the Suffolk horse, and these could be multiplied many times were it necessary to do so, but enough has probably been written to convince the reader, if he were unacquainted with the fact before, that the breed now under consideration is a very remarkably long-lived and fruitful one.

The extreme docility of the breed is another great point in its favour, as it is something for an owner to feel that he possesses a strain of horses that rarely, if ever, develop vice; but, on the contrary, are usually endowed with the sweetest of tempers and generosity. That the Suffolk is a very willing horse is rendered quite apparent by a visit to any farm upon which he is employed. Unlike many chestnuts, too, the natural gameness of the Punches is not neutralised by hot-headedness or vice of any kind.

On the contrary, they are a somewhat phlegmatic dispositioned variety, though they possess an amount of courage which enables them to face and endure the hardest of work. Above all things, he is an agricultural horse; but, where pace and strength combined are required, as in the case of town work, he is equally at home. Beyond all question of doubt, he is the most nimble and active of all the so-called heavy varieties, whilst the Suffolk, for his size, is an extremely small feeder, and will flourish and look well upon an amount of food that would be totally insufficient for many other big horses.

The head of the Suffolk Punch shows more breeding and quality about it than that of any other heavy horse, a very conspicuous feature being the eye, which is full of expression, yet mild and intelligent-looking. The neck is powerful and well formed, and the crest beautifully turned. The headpiece is well carried; the shoulders, which are very long, lie rather forward, this being desirable for the purpose of draught. The chest is wide and deep, the girth of the middle-piece being very considerable, while the body, as a whole, is long and substantially built. The back is very strong, the hind-quarters long and heavy, and close coupled with the loin, the legs standing well under the body. The fore-legs—a very essential point, for, however good an animal's top may be, he will be worthless if he has no legs and feet to carry him—must be short and flat, possessed of plenty of hard bone, big and free from feather, whilst the pasterns are short and powerful with little hair on them, the feet being of a good size and truly shaped. In general appearance, the Suffolk Punch is very happily described as being long, low, and wide, and this summary of his outline cannot possibly be bettered:—

''The Suffolk is an excellent mover, with a smart, quick step, a true balance all round at the trot, and a magnificent walker.'' As may be naturally supposed, an ultra-high flashy action is not desired, and it is naively added that ''a horse weighing a ton, bending his knee up to his throat-latch, and striking the granite with his feet like a sledge-hammer, is not an exhibition that the Suffolk trader delights in.'' In fact, a Suffolk that is heavy enough for the largest dray is seldom, if ever, called upon for an exhibition of speed and high action. Even if he is only up to ordinary van work, he is never likely to be wanted to go more than 7 or 8 miles an hour, and this class of animal will never scale a ton.

ENDURANCE OF THE AUSTRALIAN HORSE.

Of the endurance, staying power, or what is termed ''bottom,'' of the Australian horse, many instances can be given. A late horse-breeder said that, in 1873, he rode, with a weight of 13 stone, a half-bred Cleveland 95 miles in one day, between the hours of 6 o'clock a.m. and 10 o'clock p.m., with only two breaks of three-quarters of an hour each. Mr. Galvayne, the Australian horse-trainer, mentions having ridden a mare 168 miles in two days; and a Mr. Archie Ferguson, of Wallon, on the Dawson River, Queensland, rode a little horse, named Billy Button, 70 miles between the midnight and daylight of the following morning. Mr. T. S. Collins, of Eton Vale, Queensland, rode a horse, named Bonnie Doon, 104 miles between the hours of 8 a.m. and sundown. Mr. P. Bolger, on a horse named Boomerang, near Rockhampton, rode 105 miles between sunrise and sunset. A doctor at Mudgee drove a pair of ponies 120 miles to see a patient in one day. A Mr. Evans, who rode 17 stone, rode, in one day, from a station near Hillstone to Hay, a distance of 111 miles; a Mr. Henry, of Swanhill, had a station 110 miles distant, and frequently drove this distance, with half-bred Clevelands of his own breeding, in one day, returning on the next, thus making a journey of 222 miles in two consecutive days. None of the horses above referred to suffered in the slightest degree from the effects of these long and tedious journeys.

In our article on the Suffolk Punch we were able to record our own experience of the remarkable performance of a Queensland-bred horse of that breed which covered a waterless journey of 120 miles with a rest interval of only two hours.

When one considers the rough treatment that some horses receive, travelling day after day a long overland journey from dawn to dark, many nights with no greater refreshment than a whack on the rump with the bridle as they are turned out to grass on land often as bare as your hand, the endurance of many of the Australian horses is simply marvellous.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY, 1919.

The weather conditions during the month have not been satisfactory for egg production. The sudden and varied changes have upset the light breeds considerably, but it is pleasing to note how the birds that had started kept to their work in the heavy section, in many instances putting up some fine scores for the time of the year. A performance of note was the laying of Mr. R. Holmes's E bird, which laid her first egg on the 9th April, and produced fifty eggs in fifty-three days. The same owner's C bird laid thirty eggs in the thirty-one days of May. Birds are moulting in pens owned by the following:—Messrs. Fraser, Taylor, Chester, N. A. Singer, Sparrow, Mrs. Kurth, and Mar's Poultry Farm. Warts in a mild form appeared in a few pens, and bowel troubles, caused by chills resulting from the indifferent weather, were responsible for some of the checks in the output of several of the pens. The feeding in the light section is not so good as it should be. The pens showing poor feeding are those in which the laying is indifferent; misses of three and four days between eggs have occurred in some cases. There were nine cases of broodiness during the month. The following are the individual records:—

Competitors.	Breed.	May.	Total.
	LIGHT BREEDS.		
*W. Hindes	White Leghorns ...	126	232
*Dixie Egg Plant	Do.	106	222
*J. M. Manson	Do.	121	217
*E. A. Smith	Do.	1[illegible]9	199
*G. W. Hindes	Do.	99	189
*Dr. E. C. Jennings	Do.	99	188
*Range Poultry Farm	Do.	93	187
*T. Fanning	Do.	125	187
*Haden Poultry Farm	Do.	97	184
J. H. Jones (Toowoomba)	Do.	85	184
G. Williams	Do.	94	177
*C. P. Buchanan	Do.	97	172
*W. Lyell	Do.	82	171
S. McPherson	Do.	83	167
G. J. Byrnes	Do.	101	167
*W. Barker	Do.	97	164
*B. Caswell	Do.	97	164

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	May.	Total.
	LIGHT BREEDS—*continued.*		
*H. Fraser	White Leghorns ...	84	164
*Quinn's Post Poultry Farm	Do.	67	157
S. W. Rooney	Do.	72	154
H. A. Jones (Orallo)	Do.	92	153
Geo. Trapp	Do.	73	153
*Mrs. R. Hunter	Do.	90	143
*Thos. Taylor	Do.	48	138
Oakleigh Poultry Farm	Do.	67	130
*L. G. Innes	Do.	67	125
Mrs. N. Charteris...	Do.	48	120
B. Chester	Do.	49	115
R. C. J. Turner	Do.	69	109
W. A. Wilson	Do.	60	107
H. O. Jones (Blackstone)	Do.	52	103
*Mrs. A. G. Kurth	Do.	71	98
G. H. Kettle	Do.	78	88
*O. W. J. Whitman	Do.	33	87
N. A. Singer	Do.	33	86
*J. J. Davies	Do.	78	85
*Mrs. L. Anderson	Do.	58	85
W. Morrissey	Do.	52	81
C. A. Goos	Do.	21	78
J. H. Dunbar	Anconas	35	57
J. W. Newton	White Leghorns ...	36	36
	HEAVY BREEDS.		
*E. M. Larsen	Black Orpingtons ...	127	249
*R. Holmes	Do.	146	240
Geo. Nutt	Do.	109	222
*A. E. Walters	Do.	131	219
*R. Burns	Do.	102	202
*W. Smith	Do.	110	198
*Nobby Poultry Farm	Do.	99	194
*A. Shanks	Do.	101	179
*E. F. Dennis	Do.	97	177
*E. Morris	Do.	116	172
*Kelvin Poultry Farm	Plymouth Rocks ...	104	171
*D. Fulton	Black Orpingtons ...	86	168
*Jas. Ferguson	Chinese Langshans ...	94	151
Burleigh Pens	Black Orpingtons ...	63	134
*T. Hindley	Do.	89	131
*H. Puff	Rhode Island Reds ...	95	131
*W. H. Reilly	Chinese Langshans ..	55	116
A. Homan	Black Orpingtons ...	50	105
*Mars Poultry Farm	Do.	66	100
C. H. Singer	Do.	56	99
*T. B. Barber	Do.	82	94
R. B. Sparrow	Do.	41	91
*F. W. Leney	Do.	74	82
H. Ashworth	Do.	40	53
J. A. Cornwell	Do.	25	38
A. Gaydon	Do.	3	3
Total	...	5,355	9,542

* Indicates that the pen is being single tested.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
W. Hindes	48	44	39	23	39	39	232
Dixie Egg Plant	31	40	41	43	38	29	222
J. M. Manson	34	34	37	35	38	39	217
E. A. Smith	26	37	43	38	17	38	199
G. W. Hindes	38	18	39	34	28	32	189
Dr. Jennings	35	19	35	30	28	41	188
Range Poultry Farm	21	35	36	45	19	31	187
T. Fanning	41	16	34	34	29	33	187
Haden Poultry Farm	38	37	35	27	24	23	184
C. P. Buchanan	14	38	30	26	30	34	172
W. Lyell	24	37	38	29	23	20	171
W. Becker	44	29	39	32	0	20	164
B. Caswell	18	12	28	41	39	26	164
H. Fraser	17	31	38	27	19	32	164
Quinn's Post Poultry Farm ...	22	26	37	28	21	23	157
Mrs. R. Hunter	16	36	28	28	19	16	143
Thos. Taylor	39	10	12	31	31	15	138
L. G. Innes	13	27	8	26	24	27	125
Mrs. A. G. Kurth	30	20	24	23	0	1	98
O. J. B. Whitman	20	38	3	0	13	13	87
J. J. Davies	6	0	21	21	27	10	85
Mrs. L. Anderson	18	34	0	0	13	20	85
HEAVY BREEDS							
E. M. Larsen	41	47	39	32	48	42	249
R. Holmes	48	49	45	35	50	13	240
A. E. Walters	35	36	45	35	28	40	219
R. Burns	34	34	33	49	20	32	202
W. Smith	32	43	19	16	42	46	198
Nobby Poultry Farm	27	33	24	41	36	33	194
A. Shanks	12	14	44	43	27	39	179
E. F. Dennis	43	3	43	39	5	44	177
E. Morris	37	32	24	35	37	7	172
Kelvin Poultry Farm	47	14	21	19	36	34	171
D. Fulton	26	30	27	24	40	21	168
Jas. Ferguson	36	35	18	13	14	35	151
T. Hindley	39	34	0	28	14	16	131
H. Puff	34	0	26	38	17	16	131
W. H. Reilly	20	16	23	30	11	16	116
Mars Poultry Farm	0	36	29	3	0	32	100
T. B. Barber	3	22	12	20	12	25	94
F. W. Leney	8	15	25	34	0	0	82

EXPERIMENT OF CHEAP FEEDING OF LAYING HENS.

The British "Journal of the Board of Agriculture," publishes the following notes of an interesting experiment made under unfavourable conditions, of the cheap feeding of laying hens, communicated by a correspondent of that journal:—

"*No grain or grain product whatever was fed to the hens during the four and a-half months' tests.* The food was a vegetable waste, say, cabbage, two parts; carrots, turnips, and onions, together, one part; potatoes, six parts, plus one part fish meal, fed as boiled. A cabbage to peck at was occasionally hung up.

The food ratio was kept as nearly one to three as possible and tested by analysis occasionally.

The hens were kept under ordinary backyard conditions and no grass surface was available. Comfortable but inexpensive accommodation was provided for roosting and a small covered area for scratching, the balance of yard surface being gravel or ashes. The health of the hens has distinctly improved during the period of the test.

On 14th February, two hens—A and B—were purchased from a local dealer at a cost of 7s. each, understood to be on sale for killing purposes, and a third hen, C, was given for test purposes, free of cost, by a friend who was hopeless of getting eggs from her.

Hen A, which was of the White Wyandotte type, though possibly not pure, started to lay on the 9th March, and during the month of March gave 18 eggs, missing on the 10th, 12th, 14th, 19th, and 25th. In April she gave 24 eggs, missing on the 4th, 9th, 14th, 19th, 20th, and 23rd, while in May she gave 26 eggs, missing on the 4th, 14th, 21st, 25th, and 30th. In June she gave 22 eggs, missing on the 4th, 8th, 12th, 16th, 19th, 23rd, 26th, and 29th.

Her weight has varied a few ounces down, and latterly up again to her original weight.

Hen B, mongrel type, started to lay on the 16th March and gave 12 eggs, missing on the 17th, 20th, and 24th. In April she gave 15 eggs and was broody from the 6th to the 19th inclusive and missing on the 28th. In May she gave 11 eggs, missing on the 1st and 30th, and being broody from the 9th to the 26th inclusive. In June she gave 17 eggs, missing on the 29th and 30th, and being broody from the 8th to the 16th inclusive.

Hen C, mongrel type, was in poor condition and when she came had every appearance of liver trouble. She gave two eggs only in April, one on the 20th and one on the 30th. In May she gave 25 eggs, missing on the 3rd, 9th, 13th, 19th, 23rd, and 30th, and in June she gave 22 eggs, missing on the 8th, 13th, 17th, 18th, 22nd, 24th, 27th, and 30th.

Some Wyandotte chickens which had been reared to three months old on corn and soft mash have, for the past month, been fed on the same mixture of waste vegetable material with fish meal, and on weighing the cockerels on 1st July, they averaged 3¾ lb., the pullets averaging 2½ lb., and all appear to be in excellent growing condition.''

THE MUSCOVY DUCK.

SELECTION OF THE STOCK.

(By R. T. G. CAREY, Beerwah.)

This is a matter which beginners and amateurs must have in future view, and there should be no difficulty in determining what is best suited for the requirements. As a rule, the selection aimed at is generally size, rapid growth, and trueness of type. The family merits being rightly gauged, the parents impress upon the progeny their own characteristic. Good points are reproduced and improved upon; but bad points do appear and may be aggravated unless care is exercised in the breeding. By skill and knowledge the former can be increased and the latter decreased and finally eradicated; but vigilance must never be relaxed, or the bad qualities are apt to return.

The drakes influence external structure and characteristics likewise; therefore the choosing of the male or males must have size—not merely large by fat, or fluffy by feathers, but size of bone, structure, well covered by flesh, skin, and feathers; whereas small-framed males seldom produce large drakes, nor abnormally large big fellows, but, rather, have the tendency to transmit dwarfness, the descendants being often weak or deformed. Keep to careful examination and handling, feel for deformity in body or limbs, seek for defects or blemishes, and reject those culprits. It also cannot be impressed too strongly that any bird with the slightest sign of disease or hereditary taint should never be bred from.

The selected bird should be firm and close in body, of good size (but not abnormally or excessively large), well developed, strong, and short on the legs, deep in the body, and active in habits.

The duck must bear all the outward characteristic and movements, and be shapely, well built, and of fair size. Stamina and good condition are of equal importance. Both sexes have certain and defined influences upon their offspring which are acquired

by careful observation, being a guide to enable us to make the selection required. Whilst the female controls internal structure, temper, fecundity, and habit, the male controls the frame and outward delineations.

As the stock increases, so in like manner must accommodation, attention, and observation correspondingly increase. It is a bad policy to adopt the "to wait and see" and "what-will-be-done-next" method of doing things. The culture must have a leading spirit; every detail must be ahead of its time—always awaiting for the possessor. Many a novice breeder allows a muscovy duck to hatch her own eggs, and permits her to parade her family according to her own sweet will, omitting to feed the youngsters; the result is small ducks.

The correct system to adopt is to gather the eggs from the best well-built and fine breeding ducks possible. That done, the rest remains with the raiser. The eggs are incubated according to methods—hens, ducks, or incubators. Five weeks after being hatched, the ducklings, when strong enough, are removed to their happy brooding ground for about three or four weeks; then given more range—with "plenty of shade" and shelter and good ventilated house at night, but do not overcrowd. They should be kept growing from the time they leave the shell till fit for market, which is about fourteen to sixteen weeks. The selected ducks for breeding purposes usually begin to lay from five to six months old.

The young drakes being previously removed after their sex is determined, they are hastened on for the Christmas market, being fed all they will consume, three times a day.

In mating allow one drake to three or four ducks, sometimes five. For fertility, these ducks or breeders must never be allowed to run into fat, or the egg yield suffers and hatching fails; as a rule, fertility is 98 per cent.

Select breeders from those hatched earliest in spring, when they are the most vigorous and strong, or purchase them from reputable breeders. Good stock drakes or ducks can be obtained for 10s. 6d. to 42s. each. It is always best to infuse new blood; it keeps the stamina and breed up to perfection.

Healthy, vigorous breeding stock that is properly handled means "hatchable eggs"; and it is a true saying that "*ducks well hatched are half raised.*"

[TO BE CONTINUED.]

PRICKLY-PEAR IN THE SOUTH.

The Sydney "Daily Telegraph" says that Mr. Ashford, Minister for Lands, has had some experiments made in the Pilliga scrub with a view to eradicating the prickly-pear. The fruit sprayings were made with arsenated soda, caustic soda being unobtainable owing to war conditions. Although the strongest solutions were used, the results were unsatisfactory. After investigation it was decided to test an improved pear poison which was being introduced, but with the imperfections of the atomisers then in use it was recognised that the quantity of poison used, having regard to its cost, would prevent its commercial use. Efforts were, therefore, directed to the improvement of the atomisers, working in collaboration with Mr. Roberts. These have been so successful that, with the practical experience gained, the departmental officers in charge have no hesitation in asserting that a means of destruction has been found which will destroy the pear, and at a cost far below that of any other method.

It has been proved that a light spraying of the leaves only is necessary to kill, the circulation carrying the poison to the bulb. It is unnecessary to spray the stems. This is contrary to previous ideas, and enables a considerable saving of poison. The result is contributed to by the great efficiency of the present atomisers. In treating with this poison, the pear should not be slashed or broken, as this destroys the circulation. The slashing of access lanes should be carefully avoided and is a waste of time, as in very dense pear the accessible part will fall quickly after spraying, and permit access.

In conjunction with the work of pear destruction a small test was made as to the effect of this poison on timber. Seventy-five trees, mostly box and a few apple and gum, averaging 12 in. to 15 in. in diameter, were frill rung and the poison applied with an atomiser under the low pressure of 10 lb. On inspection two weeks after spraying the tops were found to be dying.

The Orchard.

CITRUS CULTURE.

In reply to a correspondent who proposes to plant citrus trees this season, we cannot do better than give the advice offered by the Director of Fruit Culture, Mr. A. H. Benson. The first thing to lead to success is to give the trees a good start, and nothing is more conducive to a good start than having the land in the right condition for planting. It is much better to get the land ready first and to plant afterwards than to plant the trees as soon as the land is cleared and then to prepare the soil. The new land should be well cleared and well stumped, so as to leave as few roots in the soil as possible, because when large roots are left in the soil there is always the danger that, whilst they are decaying, root fungus will be conveyed by them to the roots of any citrus trees that may come in contact with them. If the clearing has been well done on the right kind of soil, the breaking up of the latter is not a difficult matter, and subsoiling will not be necessary. On the other hand, if the subsoil is of a hard or tenacious character, subsoiling must be carefully carried out so as to render it sweet and friable, provide good drainage, and permit the roots of the trees to permeate it freely. Lands that require subsoiling should, as a rule, be avoided for citrus culture, as they are not the most suitable for the growth of these fruits. The method to be adopted in breaking up the land depends on its condition, as if covered with a heavy sod of couch, blady, or other grasses it is not advisable to plough too deeply at first, but to just go below the sod. The land thus broken should be well harrowed with a heavy breaking harrow, so as to get all the roots of the grass to the surface, where they will soon be killed if the weather is favourable. The next thing is to cross-plough the land as deeply as possible, and left rough, so that it may become thoroughly sweetened and aerated. When this has taken place, the land should be well harrowed, and again cross-ploughed, this third ploughing being deeper than the second. The object of this third ploughing is to get the land as deeply worked as possible, so as to have a large quantity of soil in a state of fine tilth. If there is no surface grass or sod, then the first ploughing can be deeper, but the subsequent treatment of the land should be similar. The greater depth of soil you can reduce to the state of fine tilth the better for the trees, and the better the soil will retain moisture during a dry spell. A thorough preparation of the soil also tends to develop those micro-organisms which have the power of converting the insoluble nitrogen and ammonia in the soil into soluble nitrates that are easily assimilated by the plant or tree grown therein. This power of producing soluble nitrates in the soil, which is known as nitrification, is often somewhat deficient in raw virgin land, but is increased by the sweetening of the land and by the decay of the vegetable matter that is contained in it, and which the ploughings and harrowings have thoroughly mixed with the soil.

On no account should trees be planted on raw unsweetened land, as it is better to wait a few months and have the land in good order. When the soil is ready for planting it should be laid off in squares, which gives the trees more room, and is the easiest for cultivation. In the long run it will be found that it will pay to give them plenty of room. Close planting certainly gives the orchardist a quicker return for his outlay, but in a few years the trees become so crowded that their roots occupy every inch of the ground, and the tops are so near together, if not actually crossing, that horse cultivation is impossible, the soil in consequence becoming firm and hard, and neither absorbing nor retaining moisture well. Close planting has also one other great disadvantage, in that trees so planted are much more difficult to treat for fruit pests by means of spraying or cyaniding on account of the want of room to get at and around the trees properly.

On good citrus soil no seedling sweet oranges, Sevilles, or mandarins should be planted nearer than 30 ft. apart each way, and in the case of extra good land even wider planting is necessary. Worked trees of these varieties can be planted rather nearer, say 26 by 26 ft. Limes and citrons can be planted at from 20 to 24 ft. apart.

If the land has been prepared as described, planting is a simple matter. First of all trim the roots of the young tree, carefully cutting off all bruised and broken roots, and shorten back any straggling roots. In digging the hole for the tree put the top soil on one side, and the subsoil on the other, and only take out enough to give sufficient depth to enable the tree to be set at the same depth at which it stood in the

nursery, and to permit of the roots being properly spread out. There is no necessity whatever to dig very large holes. If the land has been well prepared, it is entirely waste labour. In digging the hole for the tree, see that the centre of the hole is slightly higher than the sides, so that the roots will tend downwards instead of upwards. When the tree is set in its right place by means of the planting board, scatter a little of the fine top soil over the roots, and work it carefully between them, continuing this until the roots are all well spread out and covered. If the soil is at all dry the tree should now receive one or more 4-gallon buckets of water, and when this has soaked in the hole should be filled up to the surface with the dry soil. This is far

PLATE 2.—EMPEROR MANDARIN.
Grown on Waterfall Creek, Ingham District.

preferable to surface watering, as it does not cake the ground. The water is placed just where it is wanted, and the dry soil placed above it prevents surface evaporation and tends to retain the moisture. There is no necessity to stake the young tree, and if it has been headed in the nursery no cutting back is necessary; on the other hand, if it has not been headed, then it should be cut back to a height of about 18 in., and allowed to develop from three to five branches with which to form the head of the tree.

As many amateurs are planting citrus trees, the above instructions given by the Director of Fruit Culture will doubtless be of service to them and save them from making mistakes.

WINDBREAKS FOR ORCHARDS.

The object of a windbreak is, as the word indicates, to break the force of the wind; and the object of breaking the force of the wind is to protect the trees from the injurious effects of exposure to the full force of it. The protection of the windbreak prevents the trees from becoming loosened or blown about by it, and thus having their growth checked. A windbreak also prevents trees from becoming unshapely, as they often do when exposed to the wind. It protects the trees from cold winds which would check the development of the trees during the growing season. Windbreaks prevent fruit from being blown off the trees, and in the prairie provinces in particular they help to prevent winter killing and the drying out of the soil by hot dry winds in summer.

At the Experimental Station at Charlottetown, P.E.I., Nappan, N.S., Ste. Anne de la Pocatiere, P.Q., and Cap Rouge, P.Q., it has been found necessary to plant windbreaks to protect the orchards which at all of these places are situated where they have little natural protection, and where frequently the winds are high and cold.

Windbreaks are necessary on the prairies to lessen the drying effects of the wind both in winter and summer. It has been found that trees suffer less from winter there, where they are protected by a windbreak.

In the Provinces of Ontario and British Columbia, and in parts of the Maritime provinces, where fruits are grown in valleys and on slopes where there is good natural protection, or where they are grown where high winds are not prevalent, windbreaks are not so necessary; and in fact in many cases it may be better to have no windbreak, as the windbreak lessens the circulation of air, and injurious insects are liable to multiply much more rapidly.

A good circulation of air is necessary, also, in combating fungous diseases, as it is important to have leaves and fruit dry off as soon as possible after dew or rain; hence anything like a windbreak, or unpruned trees, which lessens circulation, may do more harm than good.

In Eastern Canada the White and Red spruces make good trees for windbreaks, though the Norway spruce will in most places grow somewhat faster, and is a good tree for this purpose. A single row of these, planted from 8 to 10 feet apart is quite sufficient under most conditions. The windbreak should be at least 50 feet away from the first row of fruit trees in Eastern Canada. The Norway spruce will grow, if properly cared for, at the rate of from 2 to 3 feet a year until it reaches a height of 50 to 60 feet or more. In very exposed places it is desirable to plant two rows of trees, the trees forming the second row being planted from 8 to 10 feet behind the trees in the first row. The first row may be composed of American Arbor-Vitæ, which is rather slow growing, and the row behind made of Norway spruce or native spruce, if desired. White pine and European larch are also rapid growing trees which are useful for windbreaks in Eastern Canada. Scotch pine is inclined to be irregular in growth, and is on this account sometimes not satisfactory. Other trees, both native and exotic, will also give good satisfaction. Lombardy poplar planted about 8 feet apart makes a windbreak in a short time, as it is a very fast growing tree.

While windbreaks are useful in Eastern Canada, they are absolutely necessary on the prairies where there is no natural protection. A windbreak on the south and west sides of an orchard or small fruit plantation to check the hot winds is of as much or greater importance on the prairies than one on the north and east sides to check the cold winds, hence it is desirable to enclose a plantation with a windbreak. Fruit trees growing close to the south or west sides of windbreaks may be more injured than benefited by the windbreak, as in late winter or early spring the sun shining on the south or west side of a windbreak raises the temperature about the fruit trees much higher than if the windbreak were not there. The fruit trees thaw out every day, frosts are severe night after night, and these extremes cause severe injury or death to the trees. Whereas, when fruit trees are on the north or east side of a windbreak, this kind of injury is not so likely to occur, and they get the protection of the other windbreak from the cold winter winds.

Some of the most useful trees for windbreaks on the prairies are the Manitoba maple or Box Elder (*Acer negundo*), the laurel-leaved willow (*Salix pentandra*), the native white spruce (*Picea canadensis*), and the Siberian pea tree (*Caragana arborescens*).

In planting trees for windbreaks on the prairies, 4 feet apart in the row is a good distance for all of the above except the Siberian pea tree, which should be planted about 18 inches apart.—"Agricultural Gazette" of Canada.

"THE CARE OF YOUR ORCHARD."

is the title of a new booklet issued by the Vacuum Oil Company, Proprietary, Limited, Melbourne. It is most informative, dealing as it does with the various insect pests which attack orchard fruits, and which are especially numerous in tropical and sub-tropical countries, such as Queensland and others. To the orchardist, the little book gives most valuable information and advice on the subject, supplemented by numerous excellent illustrations. In its pages the fruitgrower will find full descriptions of the insect pests peculiar to our tropical fruits, as well as to those which thrive best in the cooler districts of Queensland, as, for instance, in the Toowoomba, Warwick, and Stanthorpe districts, where such fruits as apples, pears, plums, apricots, cherries, gooseberries, and strawberries thrive and attain the highest perfection. Heavy losses have been sustained by fruitgrowers in all parts of Queensland, owing to the attacks of predaceous insects which can only be held in check by the persistent and careful application of chemical and other sprays and washes. Of these there is a large variety on the market. Prominent amongst these is the spray under notice, called the "Gargoyle Prepared Red Spraying Oil," one which has been vigorously tested for the past sixteen years, with the result that its value may be considered authoritative. The spray pump is the orchardist's defence. Without it, he stands to be a heavy loser. His main concern is what spray to use. He may try many insecticides and, "*experientia docet,*" he will learn by experience, and, from all that has been written and said about it, we should think that the spray under notice deserves the attention of our orchardists.

Horticulture.

NOTES ON NARCISSUS CULTIVATION.

In this climate, the best time to plant Narcissus and most other bulbs is March, but planting may extend to May with good results. As a general rule, the shorter the period the bulbs are out of the ground the better. In some cases, as in the *Poeticus* section, new roots are formed simultaneously with the drying of the old, and a decided injury is done by keeping such varieties out of the ground for a lengthened period. The best results are obtained by planting these early, about February.

VARIETIES TO CULTIVATE.

Golden Spurs.—A deep, rich yellow trumpet. It is usually the first to bloom.

Emperor.—A large flower having a deep primrose perianth, and yellow trumpet.

Poeticus Ornatus.—This white Narcissus is probably the most profitable variety that anyone can handle, and in the Old Country is grown in large quantities for cut flowers, both in the open and under glass. It blooms very freely, and being a small bulb can be planted closely, thus giving a much larger yield than any other variety.

Poeticus Plenus, or Double White.—This is the last of all the Narcissi to flower. The bulbs may remain in the ground three to four years without transplanting.

Bicolor Grandee.—This is a late trumpet Narcissus which flowers after the majority of the others, and sells well as a cut flower.

Besides these, there are many other varieties stocked by Brisbane seedsmen which may be relied upon as true to name.

MARKETING THE BLOOM.

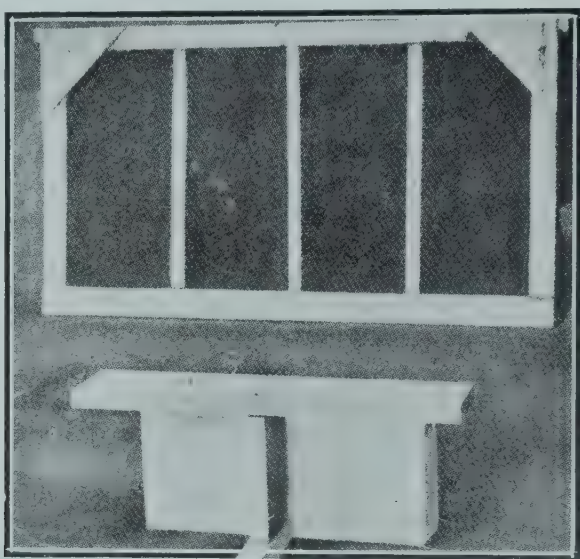
Those gardeners who grow these flowers for sale should note that, as the blooms expand, they should be gathered, and marketed whilst fresh. An effort should be made to have the bloom fit for market earlier than would be the case if left to take its natural course. This can be accomplished by pulling the flowers when in the bud state and opening them in water under glass, or by erecting a temporary covering of glass over the growing plants. The grower who raises flowers for the market who has no glasshouse is at a great disadvantage, as without this he is at the mercy of the elements at a time when much rough and stormy weather is often experienced. The cultivator with glass can gather the flowers in the bud state, open them in water, and ensure all his blooms reaching the market clean and in good condition.

It is sometimes desirable to prolong the bloom for a few days. This is done by placing the buds in water in a cool, shady shed. The best receptacles in which to place the blooms are narrow troughs or boxes divided into several sections, each about 4 in. wide.

Apiculture.

TRIAL OF A SYSTEM OF KEEPING TWO QUEENS IN A HIVE.

The bees at the Central Experimental Farm, Ottawa, have produced an average of 121 lb. of honey per colony, spring count, during the six years 1913 to 1918, showing beekeeping to be a very profitable undertaking here when carried on by those who understand it and give the bees the right attention when they need it. The figures from the Experimental Farms at Nappan, N.S., and Lethbridge, Alta, are also high, and had these apiaries been under continuous expert care like the one at Ottawa, they would probably have produced about the same returns.



1.

The high yield at Ottawa was due, primarily, to the large number of warm and fine days and good average rainfall in spring and summer, the good soil in the neighbourhood and the continuous covering of snow in winter. It was due, directly in the main to the fact that these conditions are very favourable for the growth, nectar secretion and survival from year to year of alsike and white clover, the principal sources of the honey, and also to the remarkably long and favourable period for breeding bees from the time the snow disappears in mid-April until the honey flow from these clovers begins at the end of June.

A careful study of the conditions at Ottawa shows that the ordinary methods of beekeeping do not make full use of this breeding period, and that a still higher yield could be obtained were means to be devised that would do this and that would reduce a heavy loss of bees that takes place in the winter.

In regard to loss in winter, very few colonies died outright during the winter but many lost about half of their bees. An important cause of this loss was ascertained to be stores that were more or less unwholesome and granulated. In some years the loss was high, in others only moderate, and individual colonies varied much. The experiments showed that the clover honey was more wholesome for wintering than honey gathered later in the season. A certain amount of loss in winter was also due to an insufficient number of young bees raised during August.

In regard to the breeding period in spring, colonies that passed the winter with comparatively little loss became strong enough to swarm during the honey flow from dandelion at the end of May. This swarming interrupted the breeding of bees. Although it could usually be prevented by destroying all queen-cells every week, the time soon came when the queen reached the limit of fecundity, and before long the amount of brood raised every day ceased to increase.

Another, and in some ways the greatest, problem at Ottawa has been the control of swarming. This has become a problem of labour to a great extent. After the

first rush of swarming during the dandelion flow, there is a check during a honey dearth, more or less, that occurs in June, after which swarming reaches its greatest intensity during the honey flow from clover in July. The swarming season lasts altogether for about nine weeks, from about the end of May until the beginning of August. No single manipulation such as giving more room for the queen to lay, or raising brood to the super, will prevent swarming at Ottawa, but it has been prevented by destroying all the queen-cells every week for about nine weeks. This is a great labour and not always effective. Indeed the principal labour in the apiary

2.

has been preventing swarming by lifting heavy supers of honey off the hives and searching for and destroying all queen-cells every week. If swarming is permitted, not only is the honey crop reduced because the forces of the bees are divided, but the apiary has to be constantly watched to prevent the escape of swarms, a considerable disadvantage when the beekeeper has out-apiaries to attend to. There is, therefore, a great need for a sure method of preventing swarming without much labour.

The writer has attempted to meet these different requirements with a system of keeping two queens in each hive during eleven months of the year. This system has been tried on a small scale during the season of 1918. The trial has shown the system to be workable and preparations have been made for a more extensive test in 1919, not only at the Experimental Farm, but in the open country, some distance from the city.

Two young queens separated by a double wire-cloth screen were wintered in one hive in the cellar in 1917-18. During the honey flow from dandelion, the bees and queen on one side of the screen were transferred to a separate hive; thus the desire to swarm at this time was not allowed to develop, and there was an uninterrupted and steadily increasing production of young bees from the two queens, with the result that two strong colonies were obtained in time for the opening of the honey flow from clover, the number of bees produced much exceeding the number that was obtained in hives that began the season with only one queen, 480 lb. of honey were produced by these bees.

In order to prevent swarming during the clover honey flow and to again get two young queens in each hive (all the following stages were carried out in several colonies) the old queen was removed from the brood chamber at the commencement of this honey flow and eight days later all queen-cells were destroyed except two, one on each side of the wire-cloth division then inserted. A special portico fixed in front of the hives separated the entrance of each half of the hive from that of the other by about 9 inches, to prevent the queens that emerged from the cells from meeting after returning from their mating flights. No swarming took place.*

The two prolific young queens thus obtained caused the production of more brood in August than in an ordinary colony containing only one queen, so that more young bees were raised for wintering. There was also less honey stored in the brood chamber, and as soon as the supers were removed at the end of the honey flow in September, the bees were supplied with a wholsome feed for winter consisting of a mixture of sugar syrup and clover honey which they stored in the combs

* *See* Diagrams 1 and 2.

previously occupied by the brood. A colony on this mixture had wintered well the previous year. The colonies were placed in the cellar for winter.

Provision was made for supplying a selected queen and brood at the time when the white honey was removed in early August to any hive that had lost its queen. Provision was also made for feeding the bees slowly to maintain rapid breeding during the June honey dearth, and also for insulating the hives in spring and autumn.

By this system the number of colonies is doubled every year. Modifications of the system to give a greater increase and no increase at all were worked out.

The annual requeening in this system ensures against the loss that occurs in many apiaries due to old and worn-out queens; it is also the correct treatment for European foulbrood, the most destructive disease of bees in the Ottawa Valley. In the experiments, queen-cells containing Italians of selected parentage were substituted for those raised in the colony, except in a few cases.—"Agricultural Gazette of Canada."

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY, 1919, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1919 AND 1918, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1919.	May, 1918.
North Coast.	In.		In.	In.
Atherton	2·13	18	4·04	2·24
Cairns	4·47	37	6 19	3·81
Cardwell	3 57	47	5 95	2·01
Cooktown	2·92	43	6·06	1·18
Herberton	1·64	32	2·99	0·91
Ingham	3·43	27	3 95	2 20
Innisfail	12·32	38	21 74	7 36
Mossman	2·40	11	4·24	1 18
Townsville	1·36	48	0·28	0·01
Central Coast.				
Ayr	1·16	32	0·42	0·04
Bowen	1·37	48	0·31	0·26
Charters Towers ...	0 79	37	0 52	*nil*
Mackay	3·85	48	9·99	2·04
Proserpine	5·33	16	4 89	5·08
St. Lawrence ...	1·86	48	3·00	1·41
South Coast.				
Biggenden	1·91	20	2·66	0·76
Bundaberg	2·73	36	6·53	1·01
Brisbane	2 94	68	5·47	2·49
Childers	2·38	24	2·71	1 01
Crohamhurst ...	5·00	25	11·41	5·09
Esk	2 09	32	5·42	0·53
Gayndah	1·61	48	1·56	0·54
Gympie	3·07	49	5·85	1.91
Glasshouse M'tains	3 32	11	10 37	3·33
Kilkivan	1·99	40	2·99	0·98
Maryborough ...	3·09	48	6·35	1·95
South Coast—continued:	In.		In.	In.
Nambour	4·99	23	11·41	6·59
Nanango	1·63	37	2·91	0·48
Rockhampton ...	1·53	32	4·88	1·02
Woodford	2 90	32	7·69	2·75
Darling Downs.				
Dalby	1·33	49	2·99	0·24
Emu Vale	1·17	23	2·59	0·31
Jimbour	1·24	31	1·54	0·16
Miles	1·65	34	1·45	0·32
Stanthorpe ...	1·95	46	3 46	0·27
Toowoomba ...	2·31	47	4·27	0·78
Warwick	1·63	32	2 98	0·23
Maranoa.				
Roma	1·53	45	2·24	0·06
State Farms, &c.				
Bungeworgorai ...	0·53	5	1·88	0·05
Gatton College ...	1·83	20	2·97	1·02
Gindie	1·10	19	1·49	1·84
Hermitage ...	1·22	13	3 40	0·23
Kairi	1·68	5	4·27	1·65
Sugar Experiment Station, Mackay	3·53	22	5·94	2·31
Warren	0·41	5	3·56	0·53

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year, and for the same period of 1918, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

Dairying.

STRAINING MILK.

The United States Department of Agriculture has conducted investigations on the principal sources of impurity in milk, and the "Farmers' Bulletin 1019" contains the following amongst other results of the labours of the Federal experts:—

Strainer cloths containing 35,000,000 bacteria per square inch have been found in use on dairy farms.

The average strainer cloth, of which about 36 square inches is in contact with the milk, is likely to contain fully a billion bacteria if it is not washed and sterilised after each milking.

If the cloth is folded, the number of bacteria is likely to be still greater.

Milk produced under conditions where utensils were not sterile was found to contain more than 666,000 bacteria per cubic centimeter.

When all utensils were sterilised, the average bacterial count was only about 31,000 per cubic centimeter or less than one-twentieth as many.

Bacteria in milk are not necessarily injurious to health, but they reduce its keeping quality. Certain kinds of bacteria, if too numerous, also affect its palatability. For the production of clean milk the Department of Agriculture urges strict sanitation in every dairy operation.

Utensils and strainer cloths should be thoroughly washed with warm water and washing powder, then rinsed in clean water and sterilised by boiling or steaming for five minutes. After sterilisation, the utensils, including pails, cans, strainers, and strainer cloths, should be hung in a clean place where they will be protected from flies and dust. Milk as it leaves the udder of healthy cows is clean and pure and may be kept so by following the methods outlined.

CRUSHING DATES: 1919 SEASON.

As previously stated, the crushing season this year will necessarily be later than usual, owing to the prolonged drought through which the country has passed; and it is still uncertain as to what mills will start in some of the Southern districts, owing to the shortage of cane available. It has been estimated that of the total number of mills in Queensland, there are probably about ten which will not turn a roller this season. The following dates are of course liable to alteration to seasonal developments; but they are as near as can be ascertained at the time of going to press:—

Goondi	About middle of July.
Mourilyan	Second week in July.
Victoria (Herbert River)	24th June.
Pioneer (Burdekin)	15th August.
Inkerman (Burdekin)	5th August.
Pleystowe Central (Mackay)	Mid-July.
Moreton Central (Nambour)	Mid-August.
Alberton	September.
Steglitz Mill Co.	18th August.
Kalamia (Burdekin)	Some time in July.
Racecourse Central (Mackay)	30th July.
Mulgrave Central (Cairns)	Mid-July.
Heck's Mill, Pimpama Island	End of July.
Hambledon (Cairns)	End of June.
Plane Creek (Mackay)	24th July.
Cattle Creek (Mackay)	Last week in July.
Marian Central, Mackay	About 30th July.
Babinda Central, Cairns	About 28th June.
Mossman Central	About 19th June.

—"Sugar Journal."

Tropical Industries.

THE CULTIVATION OF SUGAR-CANE IN QUEENSLAND.

By HARRY T. EASTERBY, General Superintendent, Bureau of Sugar Experiment Stations.

PART III.

It may now be useful to intending sugar-growers to give a list of different sugar districts with their sub-districts, the mills situated therein, and a few descriptive notes:—

MOSSMAN.

This, at present, is the most northerly sugar district, and is situated near Port Douglas, about four hours' steamer journey north of Cairns. The soil is nearly all alluvial, and comprises forest and scrub—mostly the latter. Good cane crops are raised; the climate is exceedingly favourable, the average rainfall being about 82 in. per annum, while the humidity during the cane-growing season is high. Land can be obtained upon reasonable terms, and the district generally may be described as a good one for cane-growing. The principal varieties grown in this locality are:—New Guinea 15 (Badila), N.G. 24 (Goru), 24A and 24B, D1135, B147, and H.Q. 426 (Clark's Seedling). The cane area is well served by tramways. The Mossman Central Mill is capable of manufacturing 10,000 tons of sugar, and is a co-operative concern under the management of a Board of Directors.

CAIRNS.

This is one of the finest sugar districts in the State, and possesses an excellent port. The sugar lands vary in nature, and are contained principally along a valley running south between ranges to the Russell River, along the route of the Coastal Railway. The cane lands commence shortly after leaving Cairns; and most of these are volcanic red soils around the Hambledon Sugar Mills, of good quality, and yielding fine crops of cane with the aid of good cultivation and fertilisers. Proceeding farther along the main line a belt of poor forest country is passed through, and then the beautiful cane areas around the Mulgrave Mill are reached. These are mainly alluvial lands, situated on the Mulgrave River, though there are also volcanic areas along the ridges. After crossing the Mulgrave River, the Aloomba cane lands are reached. These lie about 20 miles from Cairns, and comprise mostly first-class agricultural soils of an alluvial character. Most of the land was under scrub many years ago. To the south of these areas lie the now well-known Babinda lands, which may roughly be said to be comprised between Fishery Creek, the Russell River, and the Bellenden-Ker and Graham Ranges. The soils are for the most part alluvial, light in colour, with a porous subsoil. There is, however, a large area of red volcanic soil on the ridges, and, near to the Russell, practically the whole area is scrub land; and the climatic conditions for the growth of cane are exceptionally favourable, there being a very large rainfall combined with a high relative humidity. In the Cairns district there are at present three mills operating. The Hambledon Mill is the property

of the Colonial Sugar Refining Company; Mulgrave is a Central Co-operative Mill run by a Board of Directors; and Babinda is a Government Central Mill, ultimately reverting to the farmers. The amount of sugar that can be manufactured in the district with the existing mills would be in the region of 38,000 tons. All the areas around the mills are served by tramlines, and a good deal of cane is also carried along the main 3 ft. 6 in. line. The principal varieties grown are:—N.G. 15 (Badila), 24 (Goru), 24A, 24B, H.Q. 426 (Clark's Seedling), D1135, and B208. The Babinda Mill is new, and thoroughly up to date, and is capable of treating 165,000 tons of cane. New lands to the south of the Russell have recently been opened up to supply cane to this factory. To a passenger along the main line, the narrow valley between Aloomba and Babinda displays a scene of the greatest activity: planting, harvesting, and cultivation operations going on simultaneously, while large amounts of cane are being transferred to rail trucks at every siding. Altogether, this district may be summed up as a highly prosperous one and where an intending cane farmer with some capital could do remarkably well. The average rainfall varies from about 90 in. near Cairns to some 150 in. at Babinda. There is also a fine area of alluvial cane lands along the Cairns-Herberton Government Line, close to Cairns, known as Freshwater.

INNISFAIL.

This is also one of the best cane-growing districts, situated between Cairns and Townsville, on the Johnstone River, and hence frequently called the Johnstone River District. The sugar lands about Innisfail are mostly alluvial, following the river; while red volcanic soils are found back from the river on the ridges. The Mourilyan soils are also chiefly alluvial; while the South Johnstone lands near the mill are red volcanic ridges, with alluvial flats near Liverpool Creek. There are also fine red soils on the Daraji side of the North Johnstone, close to the river; but the red volcanic soils of the ridges, lying farther back, are not so good in quality. The lands surrounding the Mourilyan and Goondi Mills have been much longer under cultivation than the Daraji, Liverpool Creek, and South Johnstone areas, and are nearly all cleared and improved farms. Around the South Johnstone Mill the cane, at the present time, is being grown upon new scrub lands still under stumps. Lying farther to the south are the rich tropical scrubs of the Banyan and Tully, to which the North Coast Railway is at present being extended for the purpose of placing returned soldiers on the land for cane-growing. This cane, when grown, will be railed to the South Johnstone Mill.

The whole of the Innisfail District is particularly well adapted for cane-growing. The average relative humidity is 80 per cent., the highest probably in Australia; while the average rainfall is also very large—viz., 149 in. In consequence of these two factors, cane thrives splendidly, and the yields per acre are good and could be made much better. The district is well served by both mill and Government tramlines. The principal variety of cane grown is N.G. 15 (or Badila), which does exceedingly well in this locality. There are three mills—Goondi, Mourilyan, and South Johnstone. The first is the property of the Colonial Sugar Refining Company; the second belongs to the Australian Sugar Company; while the new, large, up-to-date factory at South Johnstone was erected by the Queensland Government. It is a sister mill to Babinda, and is redeemable by the farmers in the course of time. The three mills are capable of turning out about 40,000 tons of sugar.

HERBERT RIVER.

This fine cane-growing district is about 70 miles north of Townsville, and south of Innisfail, and comprises nearly all alluvial soil on the Herbert and Stone Rivers. Much of the country was originally forest, though a fair amount of scrub land is also under cultivation. The soils are mostly dark in colour, with clay subsoils, and grow particularly good crops of cane. There is still a good deal of land to be opened up, principally first-class forest, along the lower terraces of the Herbert River and creeks intersecting that area; but this would require opening up by tramways. The settled part of the district is connected by a large tramway system which conveys cane to the two mills and takes out goods for farmers from Lucinda Point, the port of this district. Passengers are also carried, so that means of transit are well attended to. The relative humidity is high, while the average rainfall is about 82 in. There are two sugar mills—Victoria and Macknade, the property of the Coloniel Sugar Refining Company—capable of manufacturing 28,000 tons of sugar. The district can be well recommended as being entirely suitable for the growth of cane. The varieties of cane principally grown are:—N.G. 15 (Badila), 24 (Goru), 24A, 24B, H.Q. 426 (Clark's Seeding), Q813, and B208, and D1135.

LOWER BURDEKIN DISTRICT.

We now reach a district differing in many particulars from the hot, humid cane areas of the North with their ample rainfalls. The Lower Burdekin areas, situated between 50 and 60 miles south of Townsville, comprise rich agricultural lands, but, unfortunately, possessing a rainfall not sufficient to ensure good crops of cane. This deficiency in rainfall is, on the northern side of the Lower Burdekin River, made up for by the use of irrigation water. All over what is known as the Lower Burdekin Delta water in plenty can be obtained by shallow sinking. The method in use is to drive spear heads, and then connect these up with a main from which the water is pumped and distributed by means of flumes to the surrounding cane fields. When irrigation is properly carried out, very large cane crops are ensured. Soils are deep to moderately deep alluvial loams, mostly heavy and dark, resting on granular and porous subsoils. There are also black loams with clay subsoils and sandy loams with sandy subsoils.

The greater part of the land around the township of Ayr is forest country originally bearing Moreton Bay Ash, Acacia, Cocky Apple, Beefwood, and some Popular Gum. Scrubs are found near the river at Rita Island and Jarvisfield, and these, as a rule, contain rich made land of great depth. On the south side of the river is what is known as the Inkerman District, the land being somewhat similar to that on the Ayr side. In order to provide irrigation water for this area, a large irrigation scheme has been initiated, and the works are now well advanced. The motive power will be electricity, which will operate motors upon the different farms, water being pumped out of deep cement wells. There are three mills in this district, viz.:—Pioneer, Kalamia, and Inkerman. The first and last belong to Drysdale Brothers, Ltd.; Kalamia being owned by the Australian Estates, Ltd. Between Townsville and Ayr lie the Haughton River sugar areas, which comprise good agricultural land adjacent to the river, and also lying nearer to Mount Elliot. The farmers in this locality have recently purchased the Invicta Mill, from near Bundaberg, which is now in course of removal. The four mills

should be capable of dealing with about 48,000 tons of sugar. The varieties grown are chiefly:—N.G. 15 (Badila), N.G. 24 (Goru), 24A, 24B, Q813, Q970, Q1121, M87, M89, H.Q. 426, and D1135. The average rainfall is about 45 in.

PROSERPINE.

This district is somewhat isolated, though it has the advantage of being connected by rail with Bowen (its port) and Townsville. It lies about half-way between Mackay and Bowen, and is about 160 miles south of Townsville. The country was largely forest before being cleared, and the soil is alluvial with a clay subsoil, and is wet in places, requiring surface drainage. Land may be obtained on reasonable terms, and the mill is capable of dealing with much larger crops than it receives at present. The principal varieties grown are:—Malagache, D1135, N.G. 15 (Badila), N.G. 24 (Goru), 24A, 24B, H.Q. 426 (Clark's Seedling), M.87, 89, 1474, Q1121, Q813, and Q903. There is one mill at Proserpine, owned by the State, which is capable of dealing with 7,000 tons of sugar. Tramlines connect the mill with the fields. Average rainfall, about 77 in.

MACKAY.

The district of Mackay is situated some 500 miles north of Brisbane, and is the largest sugar-producing area in the State, possessing no less than nine sugar mills. The number of cane farmers also exceeds that of any other district. The land is fertile, principally forest country, and has been a long time settled; consequently, it is all practically under the plough. The soils are mostly dark in colour, alluvial with clay subsoils. The sub-districts are:—Plane Creek (or Sarina), Racecourse, Palms, Pleystowe, Marian, Hatton, North Eton, Homebush, and Farleigh. The district of Mackay is within the tropics, and has a highly humid climate during the cane-growing season, averaging about 75 per cent. It is the farthest district south under which cane can be grown under tropical conditions, and is, on the whole, a fine district and capable of still farther expansion. Land may be procured on very easy terms, and is probably cheaper than in any other sugar district in Queensland, except perhaps Proserpine. The average rainfall amounts to 68 in. The mills are:—Farleigh (privately owned), Plane Creek (Central Mill, managed by Directors), Racecourse (ditto), Marian (ditto), North Eton (ditto), Pleystowe (privately owned), Farleigh (ditto), Homebush (Colonial Sugar Refining Company), Palms (privately owned), and Cattle Creek (ditto). These mills are capable of turning out some 65,000 tons of sugar, but are not anything like fully supplied on the average. Most of the mills have a system of tramways for the haulage of cane, but, generally, are not so well catered for as the more Northern factories. Hence a fairly large proportion of cane is carted to some of the mills by drays and wagons. The opening of the North Coast Railway from Rockhampton to Mackay, which event is expected next year, should add greatly to the district's prosperity. The average rainfall of Mackay is 68 in.

BUNDABERG.

The largest stretch of territory between any two sugar districts divides those of Mackay and Bundaberg. We have now left the tropical humid regions with their great rainfalls, and have reached what are known as the Southern sugar districts of Queensland. The district of Bundaberg is a large one, and comprises the sub-districts of Fairymead, Bingera, Gin Gin, Woongarra, Gooburrum, Avondale, Invicta, Sharon,

and North and South Kolan. The lands vary from deep, rich, red volcanic scrub land to rather poor forest country. There are also good alluvial flats near rivers and creeks. The price of land on the Woongarra Area is high; but land at lower rates may be obtained in other parts of the district on reasonable terms. The district is connected with Brisbane by rail (218 miles), and, being settled and prosperous, with a large city and good roads, is a favourite one for cane-growers desiring to make homes and settle down for the rest of their existence. Although subject to periodical droughts and frosts, the Bundaberg Area produces good crops of cane; and it has this great advantage—that cane being slower in growth will usually stand over well. Hence, if a drought is experienced one year, it is usually quite safe not to cut the cane, but to allow it to stand over till the next season when it is harvested. In this way the expense of cultivating and harvesting one crop is saved; and the standover crop is, as a rule, a heavy one, 60 and 70 tons per acre for the two years' growth being not uncommon. Upon the red soils the cost of cultivation is lower than in the North, due to the smaller growth of weeds. Ratoons are more frequently grown in these districts than in North Queensland, where cultivation is not usually carried beyond the second ratoons, while third and fourth ratoons are fairly common around Bundaberg. These are generally profitable. Altogether it may be said that, while not having the climatic advantages of the North, cane-growing about Bundaberg has many advantages, and it is a fine district to settle in, and the returns are good. There are now five mills in this locality, viz.:—Millaquin and Qunaba (the property of the Queensland National Bank), Fairymead (owned by the Fairymead Sugar Company), Bingera (Messrs. Gibson and Howes, Ltd.), and Gin Gin (Government Central). These are capable of manufacturing 50,000 tons of sugar. There is also a small mill situated at Baffle Creek, between 30 and 40 miles north of Bundaberg, principally a German settlement. The average rainfall of Bundaberg is 44 in., and the relative humidity about 68 per cent.

CHILDERS.

This is a large sugar district, situated about 20 miles south of Bundaberg. The country is an immense pocket of red volcanic soil—for the greater part rich and deep, and formerly covered with scrub. Land in this area commands a high figure for the same reasons as have been detailed with reference to the red soils in the Bundaberg District. Much of the remarks made in the preceding section also apply to this district, particularly with reference to droughts, frosts, weeds, and stand-over crops. The country is undulating, and in good seasons very fine crops are harvested. There are three mills, viz.:—Childers (Colonial Sugar Refining Company), Doolbi (Queensland National Bank), and Isis (Central, managed by Directors). The average rainfall is 42 in.

MARYBOROUGH.

This district, at one time, grew a great deal more cane than it does to-day, there being once 15 mills on this area. It may now be said to be decidedly declining from the point of view of sugar production, as dairying and agricultural crops other than cane are engaging the attention of farmers. There is one mill (owned by Messrs. Kinne, Randall, and Braddock); but it draws a good deal of its supplies from districts outside Maryborough. The capacity of the mill is about 3,500 tons of sugar. The average rainfall is 46 in.

PIALBA.

This is a small sugar-growing district, some 25 miles from Maryborough. The soil is inclined to be stony in places; but there are many patches of superior land, a good deal of which once carried scrubs of a light nature. There is no mill here; and cane is railed to factories at Maryborough, Isis, and Mount Bauple. The average rainfall is 38 in.—not sufficient to ensure maximum crops of cane every season.

YERRA.

Another small district close to Maryborough, on the Gayndah Line. There is some fair to good land in pockets. All cane grown is railed to outside mills. There is no record of rainfall.

MOUNT BAUPLE.

This district is situated between Maryborough and Brisbane, and comprises fairly good agricultural land. It suffers, however, periodically from dry weather. There is one mill (a Government Central) with a capacity of 4,000 tons of sugar. The average rainfall is, like many Southern districts, not sufficient to secure maximum crops every year.

MORETON.

This is one of the best of the Southern districts, the land being, for the most part, good to rich alluvial flats, the remainder being ridges of not so good quality. The soil is mostly dark to chocolate. Along the Maroochy River some very fine land is found, producing excellent crops of cane. The district is about 60 miles north of Brisbane, and is a good one to settle in. Due to its comparatively large rainfall (61 in.), it is more tropical in its nature than other Southern districts and the scrubs are more dense. There is one mill—the Moreton Central—situated at Nambour with a capacity of 4,500 tons of sugar.

LOGAN AND NERANG.

These districts have also declined in sugar production, farmers going in for other agricultural crops. There still remain six small mills, but the total output is small.

All the districts enumerated above have full facilities in the way of post and telegraph offices, schools, and public buildings. There are also a number of cities and towns in many of the districts—such as Cairns, Innisfail, Ingham, Ayr, Proserpine, Mackay, Bundaberg, and Maryborough.

[TO BE CONTINUED.]

REPORT ON SOME NORTHERN SUGAR DISTRICTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Field Assistant, Mr. J. C. Murray, with reference to the sugar districts of Eton, Homebush, Palms, Proserpine, Bowen, and Ayr:—

HOMEBUSH.

This area was looking well, and there was every prospect of a fair harvest. No specially heavy downfalls of rain had been registered during the few past months, consequently washaways and the usual amount of damage done by intense

tropical storms were not in evidence. A fair amount of water was lying about on the ground, caused by light showers in the latter end of March.

Agricultural operations with regard to cane planting are conducted here on much the same lines as other portions of the Mackay district. Many of the growers go in considerably for green manuring, cowpea being the principal crop used in this respect. It would probably be a good scheme if a special farm in each district could be used on a co-operative basis for the propagation of this and other seeds useful in raising green crops.

The principal cane varieties grown are Malagache, Clark's Seedling, and D 1135. Of these the former variety seems to give the most satisfactory results to the growers. It possesses a good average density, is a good ratooner, stands bad weather conditions, and is fairly free from attacks by the usual cane pests and fungoid parasites. Clark's Seedling and D 1135 are satisfactory, most of the growers being in favour of continuing the cultivation or these canes.

With regard to cane pests in the Homebush area, coots are the worst.

The soil on these plain lands is a dark loam. Grasses such as spear, nut, and blady grass are prevalent. Nut grass is by far the most difficult to keep in check.

The Homebush district seems specially suitable for irrigation. If a barrage was placed in the river above the cane farms, the water would probably gravitate over many portions of the land. Water is obtainable by sinking in ordinary dry periods at about 25 feet.

A very little liming has been done in this area. This is probably due to the expense and difficulty of obtaining this commodity. That it is most essential is shown by the fact that a large percentage of the tests taken showed the land to be sour. No outstanding agricultural experiments were noticeable in the Homebush area.

Eton and North Eton.

These areas were looking well, with every prospect of a fair crushing. Good showers of rain had fallen during the last week in March, giving the cane a vigorous green appearance.

Of the many canes raised throughout these areas the varieties finding most favour with the growers are Malagache, Clark's Seedling, N.G. 24, D. 1135, and Badila. Practically all these varieties are doing well. It is probable Badila responds quicker than the others to intensive cultivation and suitable fertiliser. Some plots under this variety look a picture, especially on Mr. Jackson's farm at North Eton. This gentleman has achieved a marked success in the use of molasses as a fertiliser. His usual method of preparation is to ensure the alkalinity of the soil by liming, then to spread the molasses broadcast by means of a tank on a dray, plough four times, and plant. In ratooning the dray is run down the rows and each stool treated with molasses. A farmer should use his own judgment with regard to the amount of molasses used, as all soil is not alike. Molasses should never be placed on sour land. It is improbable that it would be beneficial on soil that had other than strong lime properties.

This district is fairly free from cane pests, noxious weeds, &c. The soil is a dark loam with a clay subsoil interspersed with alluvial gravel. Seepage is considerable.

In common with other Mackay areas, lime would be beneficial on many of the holdings, as tests taken show acidity. Very satisfactory results are being obtained with some of the N.G. and Q. seedlings. Q. 813 and M. 89 are making a fair showing, also Q. 855. These varieties are all hardy cane with good density and ratooning properties. They seem to thrive well on moderate soils where cane such as Badila might fail.

Palms.

At the time of visiting the management of this estate was busy with agricultural work prior to planting. The soil is a dark loam with a clay subsoil cultivating and draining well.

Artificial manures, such as sulphate of ammonia and guano, are being used by some of the farmers, in some instances with satisfactory results. As in other areas, lime is required.

The principal varieties growing are Malagache, M. 89, 87, 85, Clark's Seedling, Q. 903. Borers are attacking the Clark's Seedling in places although not extensively.

PROSERPINE.

The cane round Proserpine, taken collectively, looks well. Most of the crop is plant cane, there probably not being more than about 10 per cent. ratoons. The staple varieties are Badila, Clark's Seedling, N.G. 24, D. 1135, and Malagache. In the planting that is at present going on it is probable that Badila takes the foremost place. The characteristics of the latter cane are well known and generally speaking it is a very satisfactory variety for this area. Malagache is also a good grower, one farmer cutting as high as 60 tons to the acre.

More energy is being displayed generally here by the growers with regard to obtaining commodities for agriculture that contain lime. This is gratifying and essential. A movement is on foot to get a pulveriser placed at the lime quarry at Ben Lomond.

BOWEN.

Very little cane is being grown around Bowen. It is unlikely the farmers will collectively send more than 1,000 tons to the mill this season. Varieties growing are D. 1135, Badila, Green Goru, and Malagache. The majority of the farmers are merely making cane at present a by-product, finding it more profitable under present conditions to grow legumes, fruit, &c.

Bowen is an area that should be suitable for irrigation. Water is to be found at a shallow level and good for this purpose. There is not a great deal of nut grass, and the contour of the country lends itself to the construction of drains through which water would gravitate.

AYR.

In this district a good deal of planting is going on. Badila was planted in a fairly extensive manner in March and is making a fair show, with very few misses. This cane does well here and has an average density of about 14 per cent.

Other canes that are making a fair showing in the Ayr district are Q. 813, 1121, and 903. These three varieties are showing themselves to be heavy growers of high density and possessing good stand-over properties. Off a mixed plot containing these three canes one farmer cut from a little over half an acre 20 tons.

Just prior to good rains falling, about the third week in April, many of the growers were extensively irrigating, but during the last ten days over 3 inches of rain has fallen and greatly lessened the necessity for this.

The greatest courtesy was extended to me by everyone with whom I came in contact during my visit to the different centres.

The General Superintendent of the Bureau of Sugar Experiment Stations returned to Brisbane on Saturday, 17th May, from an extended visit to the North Queensland sugar districts. A report has already been made available concerning the crops and general appearance of the Mackay and Lower Burdekin districts. After leaving those areas Mr. Easterby proceeded to Mossman where he found conditions good, a very fair crop being anticipated. The cane looks well and very little disease is visible.

Some time ago 75 per cent. of the Mossman crop was the variety known as D. 1135, but this is now being largely discarded in favour of H.Q. 426 or Clark's Seedling, of which a large percentage is now being grown. Goru and Badila is also being grown to some extent. Two Mowbray Seedlings were giving excellent results, one like Badila carrying a heavy dark-green foliage looking particularly fine. The wet season this year was late in putting in an appearance but the cane is now growing vigorously. A good deal of planting is also being done for next year. A meeting of growers was held at Mossman at which an address on cane cultivation was delivered while Drs. Illingworth and Williams (a visiting Hawaiian entomologist) also gave interesting details on their particular lines of work. The meeting was largely attended and a great amount of interest displayed by growers. This area suffered severely some years ago from floods and cyclones, but the courage of the farmers surmounted all difficulties and the district is now flourishing again. At Cairns the cane at Hambledon and Mulgrave was somewhat backward for this time of year owing to the wet season not having set in at the usual time and dry weather prevailing through much of the growing period. The recent good rains, however, have given a considerable impetus to growth and produced a great change in the colour of the foliage, while the cane has also commenced to grow vigorously. The estimate for the two mills has now been materially increased. At Babinda the usual rainfall is so heavy that a smaller amount is of considerable benefit, and this has been the case this year and has produced a very fine crop, it being estimated

that this mill alone may deal with 160,000 tons of cane. Good progress is being made at Meringa by the Entomologist, Dr. Illingworth, and the experiment plots are looking well.

At Innisfail the crops were also good, and presented a marked contrast to the cyclone-smitten cane of last season. The outlook is at present very promising. Constant rains had been falling since the end of March, which was having a fine effect on the cane generally. Grubs have done considerable damage in many parts of the South Johnstone area. On Mr. Sugden's plantation the varieties known as Badila Seedling and Hybrid No. 1 were found to be doing remarkably well. The buildings upon the new experiment station at South Johnstone have now been completed and are substantial and serviceable. The work of breaking up has been commenced and it is hoped to commence planting in August.

MOLASSES FERTILISER.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report on the application of molasses to sugar-cane from the field assistant, Mr. J. C. Murray:—

With reference to the use of molasses by Mr. W. Jackson, of North Eton, this farmer has five varieties growing that have been treated with this product. The following is a list of the canes and how treated:—

Badila.—In preparing the ground for this variety, four ploughings were given, and the land treated with filter-press cake and molasses to the extent of 3,000 gallons per acre broadcast. After the first ratoon was cut the stools were treated with molasses by running along a dray with a tank on it and letting the molasses pour over the stools. The treatment made a great difference in the cane. In no case was the fertiliser (molasses) placed on land that had an acid reaction. Incidentally no harm is done to the earthworm by this treatment. Some stools of the Badila that happened to miss the molasses were a long way behind the others as regards growth, colour, and general appearance. This variety on Mr. Jackson's farm looks better than any other Badila in the Mackay district.

D. 1135.—This variety was treated in the same manner as the Badila, but it is on a piece of land that is badly drained and inclined to acidity. No improvement noticeable.

Q. 855.—This variety has been treated in the same manner as the Badila. Mr. Jackson claims a great advance in tonnage and a heavier density since using molasses. The cane looks very healthy and strong.

H.Q. 458.—This variety has been treated in the same manner as the others and looks healthy and vigorous.

Q. 813.—This is a first ratoon crop and will probably cut 30 tons to the acre. The land was treated in the same manner as the Badila.

As regards the D. 1135 the land showed an alkaline reaction when first treated with molasses in 1916, but it has since developed a slight acidity. Probably it should have had a heavier treatment or filter press at the offset.

NOTES ON SISAL AND HENEQUEN.

In the Journal of the Jamaica Agricultural Society (February, 1919) a very useful article appeared on the subject of the cultivation of Sisal and Henequen (Fourcroya). Although this industry has practically died out in Queensland during the past ten years, previous to which time the plant was successfully grown, and when a good profit was made by planters who had installed the necessary machinery, it is yet a crop which, thriving as it does on land unsuitable for any other agricultural product, offers a good return for the fibre. About the year 1909, sisal hemp grown at Childers, at St. Helena, and in other localities, and sold at £24 per ton, yielded a profit of 50 per cent. on the cost of production. During the war the price of Sisal hemp rose to over £100 per ton, and doubtless there would have been many plantations established had it not been for the want of shipping facilities. Full instructions for the cultivation of the Sisal plant (*Agave sisalara*), as well as for the extraction of the fibre, were given in a pamphlet issued by the Department of Agriculture and Stock, which, however, is now out of print.

Botany.

LUMINOUS FUNGI.

By C. T. WHITE, Government Botanist.

The unusual wet weather experienced during May and the early part of June was especially favourable to the growth of numerous forms of the higher fungi, among the most interesting of which are those possessing the property of phosphorescence or luminosity. A large specimen of one of these was brought in to me by Mr. Eric McCorkell, who stated that he had gathered the specimens at the base of a stump between Kingston and Loganlea, and a week or two later Mr. E. W. Bick found specimens of the same thing growing at the base of a damp bushhouse wall in the Brisbane Botanic Gardens.

Material was forwarded to Dr. J. B. Cleland, of Sydney, for identification, and he replied: ''I think the luminous agaric is an example of the common pleomorphic phosphorescent Pleurotus. This is probably best called *Pleurotus lampas*, Berk., and synonyms appear to be *P. phosphoreus, P. illuminans*, and *P. candescens.''*

Several of the Agaricaceæ (mushroom family) are luminous, and, according to Dr. M. C. Cooke (''Introduction to the Study of Fungi,'' p. 89), the majority are Australian.

An interesting account of the species here illustrated, and on luminous fungi in general, is given by D. McAlpine in the ''Proceedings of the Linnean Society of New South Wales,'' vol. xxv. In it he says: ''Luminosity is a better term for the phenomenon than phosphorescence, since it is not in the nature of true phosphorescence. The luminous fungi glow without previous exposure to the sun, and the property cannot be excited by mere heat, as in the case of certain mineral substances such as phosphorite. Further, it is not due to the formation of some readily oxidizable compound of phosphorus, such as phosphuretted hydrogen in the organism, as has been shown by Pfluger. It is essentially a vital phenomenon, disappearing immediately on death, and probably the energy set free in the process of destructive metabolism is evolved in the form of light.''

Other species of luminous fungi found in Queensland are *Panus incandescens*, Berk. and Br., *Panus conchatus*, Fries, and *Hiatula Wynniæ*, Berk. and Br. The light varies considerably with the species. In the larger ones—*Pleurotus lampas* and *Panus incandescens*—it is quite strong enough to enable one to see the time indicated by the hands on the face of a watch. *Panus conchatus* is a smaller species (2 to 4 in. in diameter), and, like the previous two, shows a white light. *Hiatula Wynniæ* is a small species of a more regular mushroom appearance consisting of a cap about 1 in. in diameter on a slender stalk of about 1 in., and shows in the dark a green light.

An excellent coloured illustration of the very common New South Wales luminous fungus, *Pleurotus nidiformis* (with which Dr. Cleland thinks our plant is probably identical), is given by Cleland and Cheel in the ''Agricultural Gazette'' of New South Wales for March, 1916, where they refer to it particularly as a timber-destroying species.

PLATE 3.—PLEUROTUS LAMPAS, A LUMINOUS FUNGUS.

The measurement at the base is in inches and quarters of an inch.

Entomology.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigation, May, 1919, from the Entomologist, Dr. J. F. Illingworth:—

The continued rains have wonderfully improved the appearance of the cane in the infested areas. Fortunately, there has been no heavy wind, and in most cases the cane is still standing; even where the leaves became dry and brown new growth has started. Digging revealed new roots beginning to shoot out; apparently the grubs reached their zenith about the middle of April in this district, and they have now (10th May) almost all gone down.

MOSSMAN DISTRICT.

During the month I made a careful survey of the grub situation in the Mossman district—a region which had been of special interest to me because of the remarkable way that the grub-pest disappeared there. In former reports I have noted my observations on the emergence of the cane-beetles, which were rather numerous last December; hence, I was agreeably surprised to find that there is little evident injury from grubs this season at Mossman.

I can only assign this immunity to two important factors—late cultivation and the use of ammonium sulphate. This chemical is used rather generally throughout the district. The season, too, has been particularly favourable for late cultivation, and I found absolutely no injury to the late-planted cane. The only places where the grubs got in their work at all were in the ratoons and early-plant crops, which had been laid by before the beetles flew. An interesting example of this was on the farm of Crees Brothers. A field of 13½ acres of Badila was planted in June, 1918, on rich sandy-loam soil. Only about half of it was cultivated during the flight of the beetles in December; the other half was not worked, at that time, because of the difficulty in getting through it. The crop is most remarkable, for the portion that did not get the final cultivation has suffered considerably from the grubs, while the worked half is uninjured. The land was fallow for twelve months before planting because a crop had failed to strike. At the time of my visit, the late-cultivated portion was a beautiful dark green, with stalks of 5 or 6 ft. in length. Mr. Crees informed me that no manure was applied. One could not find a better example of the value of cultivation in the control of grubs.

The late-planted Badila in an adjoining block, on this farm, gave no indications of grubs. It is about 10 ft. high and could not look finer. About a bag of ammonia was used to the acre, after the rains began, and cultivation was continued right through the flight of the beetles.

This farm formerly belonged to Mr. F. W. Barnard, who used to have serious losses from grubs in the early days. He became an advocate of the use of carbon bisulphide; and I found that he recognised the value of late cultivation. He wrote: "Farmers in this district, on land subject to grubs, have found that by planting not earlier than September, the cane is young and growing vigorously at the time the grubs are about. The plant is then continually throwing out fresh rootlets, which enables it to withstand, to a certain extent, the onslaught of the pest. Also at the time the beetles lay their eggs cultivators are being freely used, which destroy large numbers of them." (*Vide* "The Australian Sugar Journal," vol. 1, p. 481.)

As is well known in the district, Mango Park, the estate of the late J. D. Johnson, was once a centre of infestation. Mr. Johnson tried every suggested remedy, and finally the worst fields were thrown out of cultivation. Hence I am particularly interested in this estate, for it is no longer a grubby centre. The infestation is very slight this season, and only appears in one small field of ratoons, which received no ammonia and only slight cultivation, which was finished before the beetles flew.

The crop throughout the estate is most promising this season; the foliage is a beautiful dark-green, and since the recent rains the growth has been most satisfactory. Only 123 acres are under cane at present, but a much larger area could be worked if facilities were available. The present crop could be well doubled by increased planting and more intensive cultivation.

D. 1135 has been the principal crop on this estate, and at present 77 acres of ratoons are of this variety. This cane is very resistant to drought, and since most of the ratoons had a dressing of ammonia during January the boost is most remarkable. The application of this manure was followed by gentle rains and the cane got the full benefit.

The 46 acres of plant cane was all put in late (August to November), and it is interesting to note that it has no sign of grubs, for it is on the part of the farm that used to be always affected. A part of this is on land which has been out of cultivation for seven years, because it was considered too grubby for profitable working.

Most of the plant cane has had a dressing of about 4 cwt. meatworks manure per acre, and it has made a splendid growth, especially H.Q. 426 (Clark's Seedling), which seems especially suited to that class of soil. It is double the size of the Badila, Goru, and D. 1135 planted at the same time, and covers the ground so that it has no weeds, which are abundant in the latter variety, because of its upright sparse growth.

Present observations would indicate that it is possible to grow bumper crops on even the worst infested locations by giving care to cultural methods alone.

Infested portions must be put in late, so that the cultivation coincides with the flight of the beetles, particular care being given to forcing this during the first three weeks after their appearance. Manure, also, has an important bearing, especially the nitrates, if applied at the time the cane is beginning to suffer from grubs. It gives it increased vigour and forces new roots to replace those that are eaten off.

Mr. W. P. Jones called my attention to one of his fields which demonstrates the value of intensive cultivation. He had the ground ploughed eight times previous to planting in October. This cane is now a very dense stand on the scrub land, and is about 10 ft. high. It has only had about ½ bag of ammonia per acre, but the colour is excellent. Though this land was grubby in former years, there is now no sign of injury; and there is every indication of a 50-ton crop. One can see why Mr. Jones believes in thorough cultivation and the use of nitrate for cane. It was on this estate (the late R. O. Jones) that such severe injury used to result from the grubs. The only place that they showed at all this season, was along a ridge in a field of fourth ratoons, a part of the field which had no ammonia, but the injury was of no consequence, for the cane picked up again after the grubs ceased work, about the middle of April.

There is a very interesting experiment in growing cane on the black forest land at Saltwater, on the farm owned by Mr. C. A. S. Andrews. This part of the farm has a most peculiar soil—as loose and friable as a garden, and one would naturally conclude that it would produce excellent crops. Experiments with early planting, however, have invariably come on well until the cane is about waist-high, when it quickly succumbs as if the soil was too poor or dry. To investigate this matter, last season, I dug under dead stools in this class of soil and found that *Lepidiota frenchi* grubs were abundant—enough to account for the failure. Hence, I was especially interested to find that Mr. Andrews was having success with late planting. He used both Clark's Seedling and D. 1135, and the cane has made most satisfactory growth in spite of the severe set-back that it got by the drought.

This land has been treated with 5½ cwt. meatworks manure and 1½ cwt. sulphate of ammonia per acre. This black soil is easy to work for it is free from weeds; no chipping was required, and the scarifier was used only twice; still it is very clean, and the cane is covering the ground.

The late planting in the present case has enabled the crop to escape the grubs, and it is now too late for them to injure it. By cutting in October or November, it may be possible to ratoon the field so as to avoid them again, if the horse-work is continued through December. Moreover, this pest, which has a two-year life cycle, probably will not continue after this first lot gets out of the way. The *frenchi* beetles appear to prefer blady grass, and as this is abundant on every side, they may stay out of the ploughed land.

I was interested, too, in the disappearance of the cane rats at Mossman. I could hardly find a trace of them on this trip. The mill made no small outlay in laying poison baits at the end of crushing last season. These were prepared with split canes and arsenic, and scattered in all the rat-infested localities. Results were soon evident, for dead rats were found, and there was a strong odour of carrion along several of the watercourses. At any rate, the rats are not showing up this season; and the prospects are very encouraging.

Importance of Nectar-Producing Plants in Cane Areas.

The observation of our native parasitic wasps (*Campsomeris* sp.) feeding on flowers of various plants along the Mulgrave River suggested that it would be wise to have more honey-bearing plants on the waste ground near grub-infested cane areas, so that the wasps would be attracted to these localities, and eventually turn their attention to the grubs.

It is well known that the adults of these parasites subsist upon sweet secretions, which they secure largely from flowers, when they are to be had; they also feed upon honey-dew, and, in breeding them in captivity, we found that they take any form of liquid sweet that is offered them.

As far back as 1901 Mr. J. C. Clarke (''Agricultural Gazette,'' N.S.W., 1902, p. 1-6) of the Hambledon Sugar Mill, Cairns, called attention to the importance of planting Congo or pigeon pea (*Cajanus indicus*) around each field, and the growing of the Bona Vista bean (*Dolichos lablab*) as a crop for green manure so as to encourage the multiplication of parasitic insects which feed on the nectar. He observes that the parasitic wasps were abundant at the flowers; and at the time of harvesting the cane close by in the same field, he discovered many of the larvæ of these parasites in the soil, where they were destroying the cane grubs.

In Mauritius, too, the interesting observation was made that *Tiphia parallela*, which was introduced from Barbados, only reproduced successfully in localities where nectar-bearing flowers were present. In its native home, this species never was known to visit flowers, for it fed upon the honey-dew from aphids. In Mauritius, however, plant lice are so well controlled by natural enemies that the wasps were compelled to turn their attention to flowers for existence.

These observations would suggest that our own native parasites of the white grubs might be considerably assisted and encouraged if we provided them with suitable nectar-bearing flowers in the vicinity of the infested cane areas. Naturally these wasps in their quest for food are led far into the wild country, and since they can easily find their natural prey, white grubs, there under the grasses, they seldom return to the cane areas to oviposit.

The abundant flowers of the pigeon pea are particularly attractive to hymenopterous insects. Furthermore, this plant is of recognised value for green manure (see illustration, ''Agricultural Sugar Journal,'' vol. I., p. 21) a fact which was demonstrated by the experiments of the Colonial Sugar Refining Company years ago. They found that it was even better than the black Mauritius bean, especially for the long fallow during the dry months, for its dense foliage prevented the growth of grasses.

I secured a few seed from Senator Crawford, who has a fine lot of these bushes growing in his yard, at Mossman. I shall try some experiments as to their attractive value for the wasps, by planting them along the headlands of our infested fields.

GREENHILLS ESTATE.

The immune area, which one sees upon entering the estate, is in excellent condition, both as to growth and colour. The late rains have done much to retrieve the bad effects of the drought.

Even the infested portion of the estate is considerably improved over what it was a month ago. Little of the injured cane has fallen, so, if the rains continue, much of it will form new roots and revive, now that the grubs have about completed their feeding.

It is interesting to note, again, the good appearance of the cane at the edge of the fields, bordering the feeding-trees to windward. In some cases this shows no sign of infestation; the beetles apparently flying for some distance, often several chains, before alighting to oviposit.

The October plant-cane of field J1 is still dark-green, in marked contrast to the brown fields on every side. There are only a few spots which have shown any grub injury, and these are rapidly improving. J4, just across the tramline, planted in August, is a wreck. It had a lot of cultivation, but none at the vital time—during the early part of December, when the beetles were beginning to oviposit.

It is also very satisfactory to be able to report the splendid condition of the first ratoons in the west half of L6. The slight indication of grubs, noticeable a month ago, along the tramline, has entirely disappeared, and the cane is in perfect condition. It will give a second good cut about November, and will probably ratoon again successfully during December.

It will be unfortunate for our investigations if this estate is thrown out of cultivation, as is now considered probable, since the loss caused by the grubs is so tremendous. One could not wish for a better growing soil, if the grubs would let the cane alone. It is exceedingly friable and fertile, producing satisfactory crops, even without manures. In spite of the fact, however, that I am more and more confident of success with this type of land, I can hardly expect the present lessees to go on paying out money, since they have already expended more than £26,000 above receipts, on the chance that the estate would again produce a 30,000-ton crop.

General Notes.

SOCIETIES, SHOW DATES, ETC., 1919.

KILCOY.—Kilcoy Pastoral, Agricultural, and Industrial Society. Show dates: 17th and 18th July.

NORTHGATE.—Toombul Agricultural, Horticultural, and Industrial Association. (Secretary, Percy C. Sapsford.) Show dates: 6th and 7th September.

WOLVI (*via* Gympie).—Wolvi Farmers' Progress Association. Secretary, W. F. P. Asher.

RECORD PRICE FOR TWEED RIVER BANANAS.

A correspondent of the "Daily Mail," 13th June, stated that the supply of bananas had somewhat fallen off owing to winter conditions, but abnormal prices in the Sydney market were still being obtained by Tweed growers. Recently one grower received the extraordinary price of 35s. per case. This time last year growers seemed pleased with a price varying from 11s. to 14s.

A NEW GARDEN PEST.

"Farm and Home" (Melbourne) states that, at Glenore, in Tasmania, a new garden pest has made its appearance. A small blue beetle, which hops just like a flea, has attacked the French beans, riddling the leaves just like the pear slug. They are also found in numbers on the common dock leaves. These seem to be the only two kinds of vegetation affected yet. The beetles breed at the roots of the *Acaena sanguisorba* (burr), where they also obtain their nourishment until they reach maturity, when they feed on crops. At times they do a great deal of damage to strawberries, and also attack fruit trees in a small way. They have no English name, but belong to one of the largest families of beetles in the world, which are vegetable-feeders. They are considered capable of becoming a pest in the orchard. A spraying of arsenate of lead is the best method of extermination.

"COMMONWEALTH JOURNAL OF SCIENCE AND INDUSTRY."

By the courtesy of the editor of the above journal, we are in receipt of the first number of volume 1, issued in May, 1919. This publication promises to prove of great value, as the official journal of the Commonwealth Institute of Science and Industry, as a medium for the expression of Australian scientific thought and aspiration. As stated in the "Foreword," one of the objects of the Institute is to co-ordinate scientific work carried out in the Commonwealth. As things stand to-day, scientific research work in Australia suffers severely from two desiderata. There is a paucity of trained men, and there is also a scarcity of the necessary apparatus. There are too few laboratories, and too few men to fill them. That being so, it is very essential that the best possible results should be obtained from the limited man-power and material available. The columns of "Science and Industry" are to be freely open to all scientific investigators, no matter whether they come directly under the aegis of the Institute or not. It will be an informative rather than a controversial medium. This first number of the journal, which will be published monthly, contains, amongst other interesting articles, one on the Prickly-pear Pest, another on the Artesian Water Problem, both of profound interest to the man on the land in Queensland. These are excellently illustrated.

SMOKING BACON AND HAMS.

SMOKING.

In addition to the preserving action of smoke, it imparts a relishable flavour which adds to the value of the bacon.

The process of smoking preserves flesh by coagulating the albumen near the surface and forming a protective covering or envelope.

It has been ascertained that in smoking bacon there is no loss of nutriment, and it is as digestible as fresh meat.

The smoke creates a distinct antiseptic or preservative action, apart from the dried albuminoid coating, by depositing on the surface from the smoke creosote, formaldehyde, and pyroligneous or crude acetic acid. These check the auction and growth of putrefactive organisms and their processes. They retard decomposition, as well as imparting a delicate and appetising flavour.

The smoke-house should be about 12 feet high, seeing the bacon must be hung from 6 to 10 feet from the floor.

The floor should be earthen, brick, or cement, with a depression in the centre, away from the walls, in order to avoid setting fire to the frames.

There should be no light, excepting that admitted from the door when open. Sunlight has a tendency to bleach the bacon and deprive it of its natural colour.

Whatever ventilation is provided—and some is needed—it should be under control. The aim is to surround the bacon with a dense atmosphere of smoke at a low temperature.

Many methods of creating a proper class of smoke are applicable. White pine, oak, cedar, or hardwood sawdust, with damp corncobs and a few green eucalyptus leaves will answer from which to kindle a fire with a good development of smoke without much heat; or sprinkle essence of smoke (pyroligneous acid or crude acetic acid) over the smouldering sawdust.

In case of direct heat reaching the bacon hanging over the fire, this can be avoided by having a sheet of galvanised iron placed a few feet over the fire, supported on loose bricks.

The smoke must be conveyed to the bacon as cool as it can be. To do this, care must be exercised in preventing direct heat reaching the bacon.

In deciding the length of time to apply smoke, judgment must be used. The desirable colour is a light-brown tan. To obtain this, smoking may occupy any period from thirty-six hours to five days.

The character of the flesh, its thickness, and other characteristics must be estimated in order to obtain perfection in determining the colour and flavour imparted by smoking.

Finish the sides now by dressing and rubbing the skin and flesh with pure olive oil.

Smoked bacon will hang well in the smoke-house until required, provided reasonable care be taken to exclude insects and keep the smoke-house dark, dry, and cool.

Any degree of dampness or moisture in the atmosphere in which the bacon hangs will end in mouldy bacon.

Where it is proposed to pack the bacon or ham in order to preserve it against attacks from insects or other troubles, the flesh is rolled in bran, oatmeal, shelled oats, or pea-meal, wrapped in newspapers, and stowed away on shelves or in boxes.

Every effort should be made to prevent blowflies and other pests getting access to the surface of the meat. They leave eggs on the flesh and in its numerous interstices; later on these give endless trouble. A simple means of checking their depredations is to sprinkle the surface of the meat with black pepper or a mixture containing this and cayenne pepper.

Another effective plan is to saturate calico, hessian, or clean bagging, in a creamy mixture of lime and water, and wrap the ham or bacon previously rolled in oat or peameal. Stitch the covering closely round the flesh.

MEASUREMENT OF FELLED TIMBER.

Mr. C. H. Annerley writes that he finds the rule given in the June issue of the Journal to be incorrect. The letter was submitted to Mr. A. Morry, Surveyor of the Department of Agriculture. He replies as follows:—

An error has certainly crept into Example No. 1, given on page 263 of the "Agricultural Journal" for June; but the correspondent is also in error through being unacquainted with the rules for measuring felled timber. The error in the Journal consists in stating the product shown in the example as 135 ft. *cubic,* when it should have been 135 ft. *super.* This is evidently an inadvertence, but it has easily caused a wrong calculation.

To ascertain the contents of felled timber, there are five systems of measurement known as:—

1. The "die square" method, which represents the cubic contents obtained by multiplying the length by the area of the inscribed square at the centre of the butt;
2. "Calliper" measurement, in which the area of the circumscribed square is the basis of calculation;
3. "True contents," for which the sectional area at the centre by the length are the factors;
4. "Board measurement," by which the contents are reckoned according to the number of superficial feet of one-inch boards which can be cut out of a log—allowance for bark, etc., being made;
5. "Quarter girth," in which the contents are taken as the product of the length and the square of one quarter of the circumference at the centre.

No. 3 is used on the continent of Europe; No. 4 in America; No. 5 in England; and Nos. 4 and 5 combined in Australia.

The vendor would naturally favour No. 3 method; but the purchaser would prefer No. 1, as he maintains he can only cut square timber out of this measurement. The quarter girth measurement, however, distributes the waste between vendor and purchaser, which is a fair and equitable measurement.

The rule is:—Take the square of the quarter girth in inches at the centre, which in this case is 81 in.; multiply it by the length in feet, which is 20; then divide by 144 in., when the cubic content in feet is obtained, which is $11\frac{1}{4}$; multiply this by 12 to reduce it to board measurement one inch thick, and the result is 135 superficial feet in the log.

The correspondent is in error in stating 12 in. to be the diameter of a circle which is 36 in. in circumference. The true diameter is slightly under $11\frac{1}{2}$; hence his mistake.

ERRATUM.

In our note on "Perfection in Disinfectants" in the June issue of the "Journal," the "Poplar" Borough Council, in the East End of London, was, by an oversight, printed as the "popular" council.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE, 1919.

Article.		JUNE. Prices.
Bacon	lb.	$11\frac{1}{2}$d.
Barley	bush.	5s. 3d.
Bran (Warwick)	ton	£8 15s.
Broom Millet	,,	£70 to £80
Broom Millet (Sydney price)	,,	£65 to £75
Butter (First Grade)	cwt.	177s. 4d.
Chaff, Mixed	ton	£10 10s.
Chaff, Oaten	,,	£10 to £11 10s.
Chaff, Lucerne	,,	£10 to £15
Chaff, Wheaten	,,	£6 10s. to £10
Cheese	lb.	11d.
Flour	ton	£14
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Lucerne	ton	£8 10s.
Hay, Oaten	,,	...
Hay, Wheaten	,,	...
Honey	lb.	5d. to $5\frac{3}{4}$d.
Maize	bush.	6s. to 9s. 6d.
Oats	,,	4s. 7d.
Onions	ton	£20
Peanuts	lb.	5d. to 6d.
Pollard	ton	£9 5s.
Potatoes	,,	£14 5s. to £20
Potatoes (Sweet)	cwt.	10s.
Pumpkins (Cattle)	ton	£1 12s. to £3 10s.
Eggs	doz.	2s. 1d. to 3s. 2d.
Fowls	per pair	3s. 6d. to 7s. 6d.
Ducks, English	,,	3s. 6d. to 5s. 3d.
Ducks, Muscovy	,,	5s 6d. to 8s. 3d.
Geese	,,	8s. to 9s.
Turkeys (Hens)	,,	10s. to 12s. 6d.
Turkeys (Gobblers)	,,	14s. to 26s.
Wheat (Milling)	bush.	5s. 3d.

VEGETABLES—TURBOT STREET MARKETS.

Beans, per sugar-bag	6s. to 8s.
Beetroot, per dozen bundles	1s. 6d. to 2s.
Cabbages, per dozen	2s. to 8s.
Carrots, per dozen bunches	1s. 6d. to 2s.
Cauliflower	14s. to 19s.
Cucumbers, per dozen	1s. to 2s. 3d.
Lettuce, per dozen	1s. 6d. to 2s.
Marrows, per dozen	1s. to 1s. 6d.
Parsnips, per dozen bunches	...
Peas, per sugar-bag	10s. to 14s.
Potatoes (Sweet), per cwt.	4s. to 5s. 6d.
Pumpkins (table), per cwt.	3s. 3d. to 5s. 6d.
Tomatoes, per quarter-case	3s. to 12s.
Turnips, per dozen bunches	3s. to 4s.
Turnips (Swedes), per cwt.	3s. to 4s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	JUNE. Prices.
Bananas (Queensland), per case	...
Bananas (Tweed River), per case	20s. to 35s.
Lemons, per bushel-case	11s. to 12s.
Mandarins (Queensland), per case	9s. to 10s.
Oranges (Queensland), per bushel-case	12s. to 14s.
Oranges (Navels)	10s. to 14s.
Passion Fruit, per bushel-case	12s. to 20s.
Pears, per bushel-case	5s. to 8s.
Pineapples (Queens), per double-case	9s. to 12s.
Pineapples (Ripleys), per double-case	8s. to 10s.
Pineapples (Common), per double-case	8s. to 10s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel-case	12s. to 15s.
Apples, Cooking, per bushel-case	11s. to 13s.
Bananas (Cavendish), per dozen	4d. to 9¼d.
Bananas (Sugar), per dozen	5d. to 8½d.
Cape Gooseberries, per lb.	6d.
Citrons, per cwt.	10s.
Cocoanuts, per sack	15s. to 25s.
Custard Apples, per quarter-case	4s. 6d. to 8s.
Lemons (Lisbon), per quarter-case	15s. to 20s.
Lemons (Rough), per case	5s. to 9s.
Mandarins, per case	10s. to 16s.
Oranges, per case	8s. to 14s.
Oranges (Seville), per cwt.	14s. to 18s.
Oranges (Navel), per case	12s. 6d. to 16s.
Papaw Apples, per case	2s. 6d. to 4s.
Passion Fruit, per half-bushel case	9s. to 11s.
Peanuts, per lb.	5d. to 6d.
Pears, per case	10s. to 13s.
Pineapples (Rough), per dozen	6d. to 2s. 6d.
Pineapples (Smooth), per dozen	2s. to 5s.
Pineapples (Ripley), per dozen	3s. 6d. to 5s. 6d.
Rosellas, per quarter-case	4s. to 6s.
Tomatoes (prime), per quarter-case	7s. 6d. to 11s.
Tomatoes (inferior), per quarter-case	3s. to 5s.
Strawberries, per dozen boxes	12s. 6d. to 30s.

TOP PRICES, ENOGGERA YARDS, MAY, 1919.

Animal.	MAY. Prices.
Bullocks	£17 10s. to £20 17s. 6d.
Cows	£14 to £15 10s.
Cows (Single)	£18 12s. 6d.
Merino Wethers	37s.
Crossbred Wethers	44s. 3d.
Merino Ewes	29s. 3d.
Crossbred Ewes	37s. 6d.
Lambs	29s. 9d.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5·0	6·39	5·3	6·30	5·18
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·5	6·26	5·21
8	6·17	5·11	6·33	5·0	6·39	5·6	6·26	5·22
9	6·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·34	4·59	6·39	5·7	6·23	5·23
12	6·19	5·9	6·35	4·59	6·39	5·8	6·23	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	5·0	6·38	5·9	6·20	5·25
16	6·21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5·0	6·36	5·12	6·15	5·28
22	6·25	5·3	6·38	5·0	6·36	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5·30
26	6·27	5·2	6·39	5·1	6·34	5·15	6·10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6·39	5·2	6·33	5·16	6·8	5·32
29	6·28	5·1	6·39	5·2	6·32	5·16	6·7	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6·6	5·33
31	6·29	5·0	...	...	6·31	5·17	6·5	5·33

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania.

			H. M.
7 May	☾	First Quarter	9 34 a.m.
15 ,,	○	Full Moon	11 2 a.m.
23 ,,	☽	Last Quarter	8 4 a.m.
29 ,,	●	New Moon	11 12 p.m.

The Moon will be at its farthest distance from the earth on the 14th, and at its nearest on the 29th, when there will be a tota. eclipse of the Sun visible in Africa and S. America, but not in Australia.

5 June	☾	First Quarter	10 22 p.m.
14 ,,	○	Full Moon	2 28 a.m.
21 ,,	☽	Last Quarter	3 33 p.m.
28 ,,	●	New Moon	6 53 a.m.

The Moon will be at its farthest distance from the earth on the 10th, and nearest on the 26th.

5 July	☾	First Quarter	1 17 p.m.
13 ,,	○	Full Moon	4 2 p.m.
20 ,,	☽	Last Quarter	9 3 p.m.
27 ,,	●	New Moon	3 21 p.m.

The Moon will be farthest from the earth on the 8th, and nearest on the 24th.

4 Aug.	☾	First Quarter	6 12 a.m.
12 ,,	○	Full Moon	3 40 a.m.
19 ,,	☽	Last Quarter	1 56 a.m.
26 ,,	●	New Moon	1 37 a.m.

The Moon will be farthest from the earth on the 5th, and nearest on the 18th.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, and July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Orchard Notes for August.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the spring growth. All heavy pruning should be completed previous to the rise in the sap; and where winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well-balanced main branches cut off at about 2 ft. from the trunk. When cut back, give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well-balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good, clean grown stocks budding is to be preferred.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient; but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In select wood for grafting, take that of the last season's growth that has good full buds and that is well matured; avoid extra strong or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during spring. This is a very important matter, as spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop to a greater or less extent.

Where necessary, quickly acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but in the case of pines they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb., of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

THE SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for spring.

In the warmer parts, grape pruning should be completed, and the vines should receive the winter dressing for black spot. In the Stanthorpe district grape pruning should be delayed as late as possible, so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds, side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, head back and work out by budding on the young growth.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good, sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds, which will begin to vigorously assert themselves as the weather gets warmer; therefore, keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines; and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn-out sugar lands in the Central and Northern districts, if not intended to be manured and replanted, will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown, which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do do not forget to look them over occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall was 2.63 inches, and for September 2.07 inches, increasing gradually to a rainfall of 7.69 inches in February.

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Agriculture.

SILOS AND SILO CONSTRUCTION.

By ARTHUR MORRY, Architect, Surveyor to the Department of Agriculture.

The Advantages of the Silo.—Larger quantity of food can be preserved by this method, of its original value, than by any other means.

In dry-curing methods the losses are large in comparison with small losses in silo-curing.

Storage is cheap, and the food is free from danger, from fire, rain, vermin, or insects.

Size of Silo Required.—One of the first things to be considered is that about 40 lb. per day of ensilage is considered a proper quantity for milch cows. Twenty cows would thus require 800 lb. per day; 180 days or six months would thus require 64 tons of ensilage.

If silo built round, the diameter should be 15 ft., and it would require to be 21 ft. high to hold the above quantity, viz.—64 tons. Adopting 15 ft. as a convenient standard diameter, the capacity of any silo can be easily calculated, because every foot in depth would contain a little over 3 tons of ensilage when properly settled down.

The greater the depth, as a rule, the better ensilage is obtained, on account of the increased pressure.

For silos of 50 tons or less, the diameter should not exceed 12 ft., and every foot in depth would then contain about 2.08 tons.

Round silos are preferable to square or rectangular or octagonal, and are, in fact, cheaper to build than either of the latter, because less material is required to contain a given amount of ensilage, and the walls may be thinner on account of the circular form being better able to resist pressure than the others. Another point in favour of the round silo is that no corners exist for air accumulation.

The pressure of silo walls, from the inside, has been proved to be equal to 11 lb. per square foot for each foot in depth; that is to say, that at 10 ft. from the top the pressure would be equal to 110 lb., and at 20 ft. to 220 lb. per superficial foot, and provision must be made to resist this.

A square or rectangular silo would require to be strongly buttressed with walls at least 14 in. thick, instead of 5 in. for the round silo. The walls should also be smooth and straight, to assist in the settlement of the mass, and rigid and strong, because, if allowed to spring, air spaces will be created.

When the ensilage has settled down permanently there is no longer any pressure on the walls, as it forms a kind of mat holding itself together.

It is better to build two 75-ton silos than one 150-ton.

To feed twenty cows at the rate of 40 lb. per day each, about 1½ in. would be removed from the surface of a 15-ft. diameter silo each day. Less than this is not advisable, as moulding would very likely take place.

Location of Silo.—This is not difficult to determine.

Different Types to be Considered.—French silos, which are not to be recommended and are only useful under exceptional circumstances, being liable to great waste.

Pit silos are good if ground is favourable, but must be free from moisture. The natural water level should be below bottom of silo, but there is not so much difficulty now as formerly, as waterproof Portland cements can be obtained which will ensure an absolutely dry pit.

Wood pit silos are of no use. Nothing but concrete or brick should be used in such positions, and even in rock excavation a cement face is advisable.

Brick is a useful material if made waterproof, and strengthened with bands of concrete.

The wood hoop silo is one of the best of its type, preferable to staves, as it is much stronger, and if care be taken in lining it the results may be very good. An excellent lining is cement on wire-netting, which should be tacked to the walls. The compo should be of 1½ sand to 1 cement, laid on about ½ in. or ¾ in. thick, screened in the usual way, and finished with the wood float. This makes a really good finish, especially if the cement is waterproof. A silo of this kind can be built for about £1 per ton in most localities.

The concrete silo is, however, *par excellence* the one to be recommended for permanency and utility above all others. It cannot be destroyed except with more trouble than to build it. The first cost is greater, but cheaper in the long run. If farmers could form groups and arrange for the erection of several within a given area, form a co-operative fund for the purpose, by each contributing his share, the cost of erection could be considerably reduced. Individual farmers cannot hope to personally erect these structures economically, as the equipment is expensive for one, but small when spread over a number, and men become expert at it with use. With a proper equipment, silos could be put up quickly in rotation, but it would not pay a contractor to go into a district with a plant to put up one small silo. The profit to which he would be justly entitled would be swallowed up very quickly in expenses, but if several were to be erected, that difficulty would largely be removed.

HIGHER PRICE FOR COTTON.

AMERICAN GROWERS ORGANISE.

The "Christian Science Monitor" publishes the following news from its correspondent at New Orleans, Louisiana:—

"Cotton clothing will be as expensive as silk as soon as the price-raising and crop-reducing programme, recently decided on at a meeting in New Orleans of representatives at every cotton-producing section of the United States is put into effect. The programme was unanimously adopted at the conclusion of the first cotton—acreage—reduction convention ever held, which agreed to reach the individual cotton farmer and compel him, by one means or another, to co-operate with the organisation.

"The action of this convention means that no cotton, either now or in the future, will be sold for less than thirty cents. (15d.) a pound, though it can be sold for as much more than that as the producer can get. It also means that the cotton acreage of the United States will be reduced by at least 33⅓ per cent. from that of 1917, thereby, through the law of supply and demand, forcing up the price to a point which will make cotton cloth nearly twice as expensive as it ever has been in the United States.

"Pledges were exacted from the representatives of all the cotton-growing sections not to sell any of the present crop for less than 30 cents. (15d.) a pound, and to store and hold every ounce of cotton until the demand calls for it at this figure, or more.

"State cotton—acreage—reduction committees were formed, whose business it is to obtain written pledges from every cotton-producer in all the cotton belt of the United States to reduce his acreage one-third under that of 1918, and to hold his present and future supply for a minimum price of 30 cents. (15d.).

"A resolution was adopted branding any man who refused to co-operate with the acreage reduction convention plans as 'so lacking in public spirit as to forfeit the confidence of the community in which he lives.'

"A future convention was called, though no place was named for it, before which a detailed report of the result of the plans formulated at this meeting will be received from each cotton-producing State.

"Ruffin G. Pleasant, Governor of Louisiana, presided at this meeting, and R. L. Manning, former Governor of South Carolina, chairman of the resolutions committee, presented the resolutions, which bid fair to tie up the consumer of cotton in a knot so far as prices are concerned. The resolutions were unanimously adopted, without discussion."

Looking back to the inception of cotton-growing in Queensland, growers of the present day have now the prospect of making a good thing out of cotton-growing.

The price of cotton in Queensland is ruled by the price of cotton in England. At the close of the Civil War in America, ginned cotton fell from 1s. 6d. to 2s. per lb. to as low as 4½d. During its continuance Queensland exported from 207,272 lb. in 1866 to 2,602,100 lb. in 1871. Farmers on almost all parts of the Southern coast grew small or large areas of cotton, selling at 3d. per lb., which, in those days, gave a handsome profit, and had anyone had the foresight to establish an oil mill, the 30,000,000 lb. of seed thrown away would have brought from £4 to £6 per ton, while there would have been 260,000 lb. of linters, lost for want of proper machinery. These two items alone would have produced £100,000, whilst the oil, at the then low price of £23 per ton, would have been worth over £50,000.

From the foregoing report on the action now taken by the cotton-growers of America, it is not very optimistic to conclude that the time is very near when there will be a great revival of the industry in this State. The Department of Agriculture has done everything presently possible to assist the cotton-growers, both by the free distribution of seed, and by undertaking to advance to them 2d. per lb. on all cotton delivered at the State ginnery. Furthermore, any profit derived from the sale of ginned cotton is divided amongst the suppliers *pro rata*, the only deduction being the actual cost of ginning, baling, &c. Last year, the farmers received 4½d. per lb. for their seed cotton. What does this mean to the grower? A medium crop of cotton amounts to 1,000 lb. At 4½ per lb. this is equal to £14 15s. per acre. But far higher yields have been obtained, ranging from 1,400 to 2,125 lb. per acre. These are incontrovertible facts. Now is the time to reap the benefit of conditions in America.

Late August and September are the earliest months during which to sow the seed, which farmers may obtain gratis from the Department of Agriculture. Given a fair start, then, should a drought occur, the cotton shrub will thrive, despite the want of rain, whilst most other annual crops fail to mature.

GROUND COTTON SEED.

ITS VALUE AS A STOCK FEED.

Not the least important feature of cotton-growing is the value of the cotton seed as a concentrate for balancing stock feeds. If cotton-growing develops satisfactorily, then the seed will be available in quantities which will render the extraction of the oil profitable. The residue from such an extraction ground into a meal is one of the finest concentrates for feeding dairy stock. Cotton-seed meal is somewhat superior to linseed meal in food values. It will, however, be some time before the cotton seed will be used for oil extraction; in the meantime, there is available the raw seed, and this, when ground or crushed, is a cattle feed of high value.

For the past three months ground cotton seed has been fed to the dairy stock at the Queensland Agricultural College and in quantities from 1 lb. to 3 lb. per head per day, the larger amounts being given to the cows in full milk. The results obtained have been satisfactory, and the ground seed, when it can be obtained, will certainly form portion of the ration for the College dairy stock in future.

In appearance ground cotton seed is not attractive. Adhering to the seed there is a small amount of lint, and after grinding the meal seems to contain a large amount of hairy fibre. The amount of this, however, is not great, nor has it any of the properties of hair. The cotton present is a vegetable fibre similar to the indigestible matter contained in all vegetable matter, and it has no bad effects on the animal. The flavour of cotton seed does not attract animals, and they may take a little time to get used to it. Once they get accustomed to it they eat it readily. Because cotton seed has a tendency to bind the animal, it should not be used in excessive quantities. Probably 5 lb. to 6 lb. per cow per day would be the greatest amount that should be used.

In order to obtain some idea of the comparative value of ground cotton seed the following grain rations have been run out:—

	No. 1.	No. 2.	Difference.
	lb.	lb.	lb.
Bran	194	162	32
Crushed Wheat	33	28	5
Crushed Maize	329	63	266
Linseed Meal	244	153	91
Ground Cotton Seed	—	394	—

Each of these feeds is of equal value for milk production and would be used up to 1 lb. for each 3 lb. of milk given.

Thus, 394 lb. of ground cotton seed has the same value as the sum of the quantities shown in the third column above. If we take bran at ¾d. per lb., crushed wheat at 1d. per lb., crushed maize at 1d. per lb., and linseed meal at 1½d. per lb., the value of the cotton seed works out at about 1d. per lb., or, roughly, £9 per ton of 2,000 lb.

LUCERNE GROWING.

THE CROP THAT SAVED AMERICA.

By R. W. M. STEELE.

We have often heard it stated that the American farmer is "mad" on lucerne, or "alfalfa," as he calls it. We have also often heard it stated that alfalfa saved America. We do not hear, however, another statement which is also true: It was the application of science to lucerne-growing which saved America. We might with reason ask, "Will lucerne save Queensland?" I think it will, but we will have to apply science to its culture. Haphazard methods must go. On the Darling Downs lucerne is a widely grown, but little-cultivated, crop. Yet, generally speaking, we have the advantage over the American farmer, except where he uses irrigation. Firstly, we have not to fight the snow, as the States farmer has if he lives in certain of the States. Secondly, in the central-west, the States farmer has to contend with gophers and prairie dogs. These soon ruin a good stand of lucerne. Grasshoppers we sometimes get, but these are migratory; those with which the States farmer has to contend are not migratory, but breed and pass their lives on the alfalfa fields. We are not troubled to any great extent with that troublesome parasitical plant, dodder.

Notwithstanding these disadvantages the scientific methods employed have carried the States farmer through. The agricultural colleges have done great work in this respect. They have tested and proved the feeding value of lucerne. The States farmer knows just how to use it—

(1) For dairy cows (milk producing).
(2) For fattening steers (meat producing).
(3) For swine (bacon producing).
(4) For sheep (mutton and wool producing).
(5) For his working horses.
(6) For poultry (egg producing).
(7) And as a honey producer.

Each of these uses forms an essay in itself. The agricultural colleges have also taught the States farmer to get every ounce of "food value" out of his lucerne. The farmer knows what a "balance ration" is, and how to arrive at it. I wonder how many of our best farmers in Queensland are as well informed. Yet we have agricultural colleges and experimental farms. Food values are simple enough to be taught to any V.-class boy, in our State schools. Why should it not be done?

I would also like to point out that lucerne has saved the Argentine Republic, our great rival in the meat trade. Science was again brought into play. Foster Fraser, in his book "The Amazing Argentine," says:—"Give us of the best. Let us be up-to-date and scientific, so that the Argentine may have first place." This is the attitude of the Argentine towards agriculture. Can it be wondered that such a country is pushing us hard in the meat trade? C. P. Ogilvie, in "Argentine from a British Point of View," says:—"No business in Argentine has shown such good returns as cattle-breeding, and these results have been brought about by the introduction of alfalfa, and a knowledge of the life history of alfalfa is of greater interest to the cattle-farmer." The colleges have taught the States farmer scientific cultivation. Professor J. G. Haney says:—"It is demonstrated beyond doubt that alfalfa (lucerne) must have some cultivation to secure its best development. Statements of what it is possible to do for this plant with disc and harrow can hardly be believed

without demonstration. By means of cultivation alfalfa can be made to succeed in many places where it is now a pronounced failure. After the first year it will stand a great amount of surface disturbance. It should receive a thorough harrowing with a sharp harrow, the spring after seeding, or after each cutting. When two or three years old a disc harrow should be used.

Method of discing—

(1) Discs should be set nearly straight and weighted.
(2) Disc both ways.
(3) Discs are sometimes set at a slight angle to turn soil over. They must be weighted in order to "split the crowns."
(4) If stand is poor, discs are set at a greater angle, especially if grass is thick.
(5) Harrow down smooth.

Advantages—

(1) Discing destroys all surface roots, but does not destroy deep-rooted lucerne.
(2) Splitting crowns makes them throw out new shoots, invigorates growth, and thickens the stand.
(3) Discing makes an earth mulch over the field, and prevents the evaporation, which is so rapid in a newly cut field.

Results obtained by discing:—In an agricultural college in the States, dry year, rainfall (June, 1.19 in., July 4.51 in., August 2.84 in.), a field of lucerne received—

First discing, 28th March, yielded first cutting 31st May.
Second discing, 6th June, yielded second cutting 25th June.
Third discing, 27th June, yielded third cutting 13th August.
Fourth discing, 20th August, yielded fourth cutting 13th September.

This shows four discings and four cuttings of lucerne on upland in a dry year. This surely shows that discing and harrowing are of as much value to lucerne as cultivation is to maize. Would it not be a step in the right direction if these simple scientific methods, and the reasons for them, were taught in our State schools in agricultural and dairying districts? The experimental plots need only be small, but the value to the lad who is by and bye going to make "Australia great" would be inestimable.—"Daily Mail."

INCREASED YIELDS AS THE RESULT OF SWELLING SEEDS IN WATER.

Dr. Franklin Kidd and Dr. Cyril West, of the Imperial College of Science and Technology, lately communicated the following note to the "Journal of the Board of Agriculture," England, on the above subject:—

Much interest has been aroused recently amongst agriculturists as to the possibility of obtaining increased yields from seeds which have been submitted to treatments in which soaking in water or in salt solutions plays a part. It therefore seems appropriate to draw attention to this subject.

Some forty years ago two German agriculturists of repute—namely, C. Kraus and E. Wollny, showed that increased yields could be obtained by swelling seeds in water.

Their main conclusions may be summarised as follows:—

(1) In order to obtain the best results, the seeds must be swollen in the minimum amount of water necessary to saturate the seeds thoroughly. (If a large excess of water is used, the effect upon the subsequent growth and yield of the plants may be harmful.)
(2) The time of immersion should be sufficiently long for the seeds to become fully swollen.
(3) A subsequent re-drying of the seed does not appreciably alter the beneficial effect of the treatment, but the re-drying must not be carried out too rapidly.
(4) The percentage of germination is liable to be slightly decreased by the treatment.
(5) Swelling seeds in solutions of nutrient salts has much the same effect upon yield as swelling the seeds in pure water.
(6) All the seeds tested (*i.e.*, the chief cereals, and various other annuals of economic importance) gave the same result, with the exception of winter rye.

FARMERS' SHEEP AS PROFITABLE PETS.

By R. C. WILSON, Assistant Instructor in Sheep and Wool.

Amongst the large number of settlers following farming pursuits in Queensland, very few ever realise the value of a few sheep on the farm and the profits to be derived from this most useful of animals.

A very convincing and interesting article appeared in the "Live Stock Bulletin," by Mr. Munro Hull, detailing his experiment with sheep on a coastal farm. This gentleman is a progressive farmer, and deserves full credit for the way in which he proved, by actual results, the advantages of running a few sheep on every small farm.

In raising sheep for wool and mutton, outside of the other uses they can be put to, the farmer is producing articles for which there is a world-wide demand.

But until the farmer has had personal experience of the advantages and disadvantages of sheep, and the uses they can be put to, it is not necessary to start with a great number.

I would, for the start, advise that individual farmers procure, say, 10 to 25 sheep, which will run round the house, yards, &c., and do well, practically with the fowls. While so doing, the farmer could watch their habits and study them with a view of running a larger number with advantage to himself, and meanwhile procure such information on sheep as is supplied by the Department of Agriculture and Stock, particularly in reference to diseases sheep are subject to in Queensland, and how to recognise them. Queensland is free of most diseases affecting sheep in other parts of the world, and the few we have are easily dealt with.

It will be found that through having a few sheep on the farm, though very little trouble to care for, the children will take a keen interest in them, which will serve to improve their general knowledge of stock for the future benefit of both themselves and the country they take up when settling.

A particular feature about children and sheep is that I have often heard fathers refer to boys and girls of six to eight years of age, the question as to which lamb belonged to a particular ewe, when the answer would come, "That is Tommy; he is Jennie's lamb," or something to that effect, and they would always be right, too.

Keen interest is taken by most farmers' children in the lambs, all of which they have usually named, and know them apart, while to most of us grown-ups they all look alike and are just sheep or lambs.

The extra food values of a few sheep on the farm are not to be despised, and though one does not care to kill pets, what is better than fresh, choice mutton, fattened and killed on the farm, after eating nothing but beef or indifferent mutton supplied by local butchers after perhaps travelling great distances?

To run sheep successfully on the coast lands, one *must not* depend on the natural grasses. Though odd farmers may succeed under these conditions, it is certain that there would be a great many more failures.

Though they can be put to many uses, such as eating down weeds, scrub, &c., it is necessary, while so doing, to give them some fresh and green feed of an evening. Doing it in this way, the place will not be cleaned up so quickly, and the sheep will not suffer in consequence of being half starved.

Paspalum makes good grazing, but owing to its containing so much water and losing value by being frost-bitten, it is not so good for sheep as Rhodes grass.

Rhodes grass is a very valuable fodder for sheep, comparing favourably with lucerne, and though it suffers from frost, it is not destroyed, and green shoots will always be found near the ground.

Couch grass is also a useful grass for sheep. When grazing off lucerne, &c., sheep should never be turned in hungry, or there will be a large percentage of losses through hoven (otherwise bloat). They should be turned in with stomach fairly full for an hour in the evening, when they should be carefully watched and removed at once if any sign of trouble is noticed. The first sign is a slight swelling on the left side of the animal. When this apppears withdraw the sufferers at once.

Lucerne can be hand-fed well wilted, or half dry, with safety to sheep. In dry times they can be fed on a ration of 4lb. of ensilage per head, with such other dry feed as they can pick up.

Taking over a number of years and allowing for odd dry times, good scrub land under Rhodes grass will run three sheep to the acre. In some cases I have known up to ten sheep being run per acre on coast land, but that is looking for trouble, and unless the particular farmer has prepared for dry times by conserving fodder in the form of ensilage or hay, he will, some time or other, have a big smash and practically lose the lot.

At four sheep to the acre, and averaging per ewe at £1 (in that she has one lamb per year, value 14s., and will cut wool to the value of 6s.), these figures being net, a farmer would receive £80 per year for 80 good ewes running on 20 acres.

As some farmers' ewes have the ram with them all the year, the increase would be greater, but more attention would have to be given in care of ewes and lambs; also, a number of crossbred ewes have twin lambs, which would outbalance any ewes that did not lamb. In a small flock always together, few ewes ever miss taking the ram.

For the farmer, the most profitable sheep to breed is the crossbred, but as crossbred ewes are not always available, and are expensive to buy when wanted, it is advisable to procure a few sound merino ewes (plain-bodied Western ewes preferred) about four to six tooth, the bigger the better, and join them to a Border Leicester or Romney Marsh ram; this latter for coastal areas.

The Border Leicester is a good wool and mutton sheep, maturing early and suitable for high or fairly dry land, whilst where the ground is low or wet and having a heavy rainfall, the Romney Marsh is the best sheep, being hardier and more suited for that class of country. He also is a dual purpose sheep, maturing fairly early.

As an improver of soils and pastures, the sheep is right out in the lead. No doubt they pick out the choice feed in the paddock, but they also distribute the seed, manuring it at the same time, when it is only a matter of time and the difference in grass and feed will be noticeable to the most casual observer. There are places in Queensland where, on one side of the netting fence, cattle were run, and on the other side sheep, and as regards feed, the sheep side shows to great advantage over the coarse grasses on the cattle side. With sheep, as with all other stock, care must be exercised, as a pasture can be ruined by overstocking.

There are only two drawbacks that can honestly be brought against sheep on the coast, and they are dogs and internal parasites, such as stomach worms, &c.

Dealing with dogs: If a farmer has not netted in a run for the sheep, they must be yarded near the house every night, and if trained to it regularly for the first few weeks they will then go in of their own accord, and all that will be necessary to do will be to count them and shut the gate. Keep the salt box at the yards; that will attract them.

The internal parasites, &c., can be dealt with here in Queensland equally as well as they can in any other part of the world. They may be cleaned right out of a flock by drenching regularly and by the use of salt licks, which should be always available to the sheep. It is much better, on new country, to well drench the sheep before bringing them on to the property, and thereby save future trouble.

Where there are badly-infested sheep, the trouble is usually with the farmer himself, through, perhaps, inexperience or by putting off the drenching until losses occur. In some cases it is through the sheep not receiving sufficient nourishment to keep them healthy.

The wool from one to 1,500 sheep will be received by this Department, valued, classed, and sold in its various grades under one brand, D.A. in diamond, on account of farmer owners. Previous to wool being sold, an advance, if required, of 60 per cent. of the full value is allowed to the farmer on its arrival at the store. Should a farmer consider giving sheep a trial, he should avail himself of expert advice on breed, diseases, or any other information in management of sheep, which is supplied free on application to the Department of Agriculture and Stock.

VALUE OF RYE GRASS.

Mr. J. S. Clarke, Kuraby, writes as follows on this subject:—

Three years ago I sowed New Zealand oats, with which were mixed some seeds of Poverty Bay grass, and also of sorrel. Last year's drought killed the sorrel, but the rye grass survived and lived all through the winter and spring, stunted, but producing much seed. It is now flourishing, and spreading over the sandy loam land, looking a brilliant green, notwithstanding three hard frosts. This may be the same species reported as covering 2,000 acres in the Wimmera district, Victoria.

In any case it is, to my mind, a most important acquisition, being a fattening proposition which is urgently needed to supply stock with early spring feed not available from the native grasses. As the land on which this grass is growing was ploughed and cultivated twice in summer, the soil being very dry, no doubt the seed lay dormant until the rain came about March or April. It then germinated in the autumn, and came away when the weather was favourable, with good results. This grass should, in the future, enable growers to treble the stock-carrying capacity per acre.

To the dairying community it should be worth a fair trial. Poverty Bay rye grass seed is quoted in Sydney at 15s. per bushel for best quality.

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The Office of the Secretary of the undermentioned Herd Book Societies is 303 Queen street, Brisbane:—

The Australian Hereford Herd Book;
The Shorthorn Herd Book of Queensland;
The Jersey Herd Book of Queensland;
The Illawarra Herd Book of Queensland;
The Ayrshire Herd Book of Queensland;
The Milking Shorthorn Herd Book of Queensland;
The Holstein-Friesian Herd Book of Australia.

NOTE.—Animals registered in the Commonwealth Standard Herd Book are not necessarily eligible for entry in the Jersey Herd Book of Queensland.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
	DAIRY BREEDS.			
	AYRSHIRES.			
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
J. H. Paten	Gwandalan, Yandina	6	21	Do.
Queensland Agricultural College	Gatton	4	10	Do.
State Farm	Warren	3	83	Do.
J. W. Paten	Ayrshire Park, Wanora, Ipswich	10	42	Do.
J. H. Fairfax	Marinya, Cambooya	9	55	Do.
J. Holmes	"Longlands," Pittsworth	6	20	Do.
H. M. Hart	Glen Heath, Yalangur	7	21	Do.
F. A. Stimpson ..	Ayrshire Stud, Fairfield, South Brisbane	7	77	Do.
M. L. Cochrane ..	Paringa Farm, near Cairns	5	21	Do.
John Anderson ..	"Fairview," Southbrook	7	34	Do.
	JERSEYS.			
T. Mullen	"Norwood," Chelmer	3	20	Jersey Herd Book of Queensland
Queensland Agricultural College	Gatton	2	31	Do.
M. W. Doyle	"Oaklands," Moggill	4	12	Do.
G. A. Buss	Bundaberg	1	15	Do.
R. Conochie	Brooklands, Tingoora	9	21	Do.
W. J. Barnes	Millstream Jersey Herd, Cedar Grove	10	37	Do.
W. J. Affleck	Grasmere, N. Pine ..	6	31	Do.
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Do.
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	2	11	Do.
State Farm, Kairi ..	Kairi, *viâ* Cairns ..	4	16	Do.
H. D. B. Cox	Sydney (entered in brother's name)	3	16	Commonwealth Standard Jersey Herd Book
	GUERNSEYS.			
Queensland Agricultural College	Gatton	2	2	Eligible, but no Guernsey Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
	DAIRY BREEDS—*continued.*			
	HOLSTEINS.			
Queensland Agricultural College	Gatton	2	9	Holstein-Friesian Herd Book of Australia
George Newman ..	"St. Athan," Wyreema	9	92	Do.
F. G. C. Gratton ..	"Fowlerton," Kingsthorpe	1	15	Do.
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	3	Do.
Ditto	Ditto	1	..	Holstein-Friesian Herd Book of New Zealand
S. H. Hoskings ..	St. Gwithian, Toogooloowah	..	..	Holstein-Friesian Herd Book of Australia
C. Behrendorff ..	Inavale Stud Farm, Bunjgurgen, Q.	3	9	Do.
E. Swayne	West Plane Creek, Mackay	1	2	Do.
	ILLAWARRA.			
A. Pickels	Blacklands Stud, Wondai	4	62	Illawarra Herd Book of Queensland
J. T. Perrett and Son	Corndale, Coolabunia	3	43	Do.
W. T. Savage	Ramsay	2	22	Do.
Hunt Bros.	Springdale, Maleny ..	3	62	Do.
	MILKING SHORTHORNS.			
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Do.
A. Rodgers	Torran's Vale, Lanefield	1	9	Do.
W. Middleton	Devon Court, Crow's Nest	3	27	Do.
A. K. Yorksten ..	"Dunure," Miles ..	2	8	Do.
W. H. Francis ..	"Exelawn," Colinton, Brisbane Valley Line	3	5	Do.
	BEEF BREEDS.			
	SHORTHORNS.			
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
Godfrey Morgan ..	"Arubial," Condamine	3	6	Do.
W. B. Slade	E. Glengallan, Warwick	2	20	Do.
	HEREFORD.			
A. J. McConnell ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Do.
Tindal and Son ..	Gunyan, Inglewood	50	400	Do.
	SUSSEX.			
James T. Turner ..	The Holmwood, Neurum	2	4	Sussex Herd Book of England

Poultry.

REPORT OF EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JUNE, 1919.

The laying for the month in the light breed sections has been unsatisfactory, being as varied as the weather conditions, which have been of a regular wintry nature. The heavy breeds have, on the whole, done well, and some very fine laying has been done by individual pens. The best single score for the month by a Leghorn was made by Dixie Egg Plant's D bird, with 23 eggs. In Black Orpingtons, R. Holmes's E scored 28. A Plymouth Rock owned by the Kelvin Poultry Farm laid 25; A in both Ferguson's and Reilly's pens scored 24; and one of H. Puff's Rhode Island Reds laid 23 eggs. There were ten cases of broodiness in the heavy section, and one in the light section. The health of the birds has been good. One of C. H. Singer's birds died, and has been replaced. Two birds from W. Morrissey's pen were destroyed, and these also have been replaced. The following are the individual records:—

Competitors.	Breed.	June.	Total.
	LIGHT BREEDS.		
*W. Hindes	White Leghorns ...	118	350
*J. M. Manson	Do.	126	343
*Dixie Egg Plant	Do.	111	333
*T. Fanning	Do.	123	310
*E. A. Smith	Do.	98	297
*Haden Poultry Farm	Do.	108	292
*Dr. E. C. Jennings	Do.	101	289
*G. W. Hindes	Do.	98	287
*Range Poultry Farm	Do.	90	277
S. McPherson	Do.	106	273
G. Williams	Do.	82	259
*C. P. Buchanan	Do.	86	258
G. J. Byrnes	Do.	89	256
*Quinn's Post Poultry Farm	Do.	97	254
*B. Caswell	Do.	87	251
J. H. Jones (Toowoomba)	Do.	60	244
*W. Becker	Do.	76	240
*H. Fraser	Do.	76	240
H. A. Jones (Orallo)	Do.	81	234
*W. Lyell	Do.	60	231
S. W. Rooney	Do.	73	227
W. A. Wilson	Do.	108	215
*Mrs. R. Hunter	Do.	68	211
*L. G. Innes	Do.	75	200

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	June.	Total.
LIGHT BREEDS—*continued.*			
Geo. Trapp	Do.	45	198
*J. J. Davies	Do.	106	191
*Mrs. L. Anderson	Do.	103	188
G. H. Kettle	Do.	94	182
Mrs. N. Charteris...	Do.	56	176
*Thos. Taylor	Do.	37	175
Oakleigh Poultry Farm	Do.	44	174
R. C. J. Turner	Do.	60	169
*Mrs. A. G. Kurth	Do.	68	166
B. Chester	Do.	48	163
C. A. Goos	Do.	79	157
H. O. Jones (Blackstone)	Do.	52	155
*O. W. J. Whitman	Do.	58	145
W. Morrissey	Do.	52	133
J. H. Dunbar	Anconas	66	123
J. W. Newton	White Leghorns ...	69	105
N. A. Singer	Do.	18	104
HEAVY BREEDS.			
*E. Holmes	Black Orpingtons ...	151	391
*E. M. Larsen	Do.	101	350
Geo. Nutt	Do.	122	344
*A. E. Walters	Do.	105	324
*R. Burns	Do.	115	317
*E. F. Dennis	Do.	136	313
*W. Smith	Do.	108	306
*A. Shanks	Do.	116	295
*D. Fulton...	Do.	125	293
*E. Morris	Do.	114	286
*Kelvin Poultry Farm	Plymouth Rocks ...	114	285
*Nobby Poultry Farm	Black Orpingtons ...	83	277
*Jas. Ferguson	Chinese Langshans ...	102	253
*H. Puff	Rhode Island Reds ...	104	235
*W. H. Reilly	Chinese Langshans ...	114	230
*T. Hindley	Black Orpingtons ...	89	220
Burleigh Pens	Do.	81	215
A. Homan	Do.	77	182
*T. B. Barber	Do.	82	176
*Mars Poultry Farm	Do.	68	168
C. H. Singer	Do.	67	166
R. B. Sparrow	Do.	45	136
*F. W. Leney	Do.	50	132
J. A. Cornwell	Do.	74	112
H. Ashworth	Do.	37	90
A. Gaydon	Do.	72	75
Total	...	5,704	15,246

* Indicates that the pen is engaged in single hen test.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
W. Hindes	68	64	58	43	58	59	350
J. M. Manson	55	54	59	56	58	61	343
Dixie Egg Plant	53	55	61	66	50	48	333
T. Fanning	62	35	54	55	50	54	310
E. A. Smith	44	48	62	48	37	58	297
Haden Poultry Farm	57	56	55	47	35	42	292
Dr. Jennings	53	28	55	48	47	58	289
G. W. Hindes	58	27	59	51	42	50	287
Range Poultry Farm	24	49	58	65	32	49	277
C. P. Buchanan	29	56	44	34	41	54	258
Quinn's Post Poultry Farm ...	41	46	57	47	38	25	254
B. Caswell	32	12	43	61	61	42	251
W. Becker	66	48	58	32	0	36	240
H. Fraser	25	40	57	41	30	47	240
W. Lyell	24	54	53	48	25	27	231
Mrs. R. Hunter	28	51	39	37	31	25	211
L. G. Innes	13	47	15	42	43	40	200
J. J. Davies	22	18	39	41	44	27	191
Mrs. L. Anderson	38	53	16	16	26	39	188
Thos. Taylor	48	10	12	48	42	15	175
Mrs. A. G. Kurth	48	31	41	30	0	16	166
O. W. J. Whitman	20	50	18	12	23	22	145
HEAVY BREEDS							
E. Holmes	72	73	73	60	76	37	391
E. M. Larsen	62	68	47	42	69	62	350
A. E. Walters	53	57	67	52	35	60	324
R. Burns	52	53	56	74	36	46	317
E. F. Dennis	67	26	66	56	28	70	313
W. Smith	32	66	43	38	66	61	306
A. Shanks	23	24	67	66	50	65	295
D. Fulton	47	50	52	47	59	38	293
E. Morris	58	54	45	44	62	23	286
Kelvin Poultry Farm	72	34	38	38	54	49	285
Nobby Poultry Farm	39	35	39	56	56	52	277
Jas. Ferguson	53	56	35	37	30	42	253
H. Puff	54	10	41	58	40	32	235
W. H. Reilly	39	24	44	51	32	40	230
T. Hindley	61	48	0	47	33	31	220
T. B. Barber	17	37	31	33	32	26	176
Mars Poultry Farm	11	54	52	3	0	48	168
F. W. Leney	14	24	38	52	1	3	132

POULTRY EXPORT.

The Department of Agriculture and Stock has received from the Agent-General, through the Chief Secretary's Department, a letter from Messrs. Sproat and Co., of Smithfield, in reference to the export of poultry, and stating they are prepared to receive a consignment for testing the market.

The firm writes:—"Never before has such an opportunity presented itself for the inauguration and development of this industry, as Russia, the great competitor at this season, will be unable to regain her pre-war commercial standing (it is thought) for some years to come.

"The pre-war price for chickens and young fowls was about 10d. per lb., but that was in the days when large quantities of Russian were forthcoming, so that there will not be a reversion to pre-war rates for some years. The present prices (under Government control) are as follows:—

	Chickens and Fowls.	Turkeys.	Ducks.
	s. d.	s. d.	s. d.
To the wholesaler	1 10½ ..	1 10½ ..	1 8
To the retailer	2 2 ..	2 2 ..	1 10
To the consumer	2 8 ..	2 8 ..	2 3

"Our opinion is that, when the control is removed, prices may even go higher for a short period, ultimately coming down to about 1s. 6d. per lb., much depending on the quality and condition.

"Chickens (as packed by other importers)—twelve in a case. The outside measurement of the case being 2 feet 6 inches by 1 foot 6 inches by 4½ inches; thickness of wood used, 3.8 inches. If it would be an economy to pack twenty-four birds instead of twelve, there is no objection at this end. Failing to cover each fowl with thin grease-proof paper, cases should be lined with such. Please keep an eye on appearance.

"Observe uniformity in weight, so that each bird in a case may not vary from the other. Classification in quality must also be attended to—far better separate the best from the secondary bird. Better still, discard the latter, and don't send. When packing, allowance should be made for loss in weight in the process of freezing and transit, so that the buyer is assured that box-weight description represents fairly accurately the actual weight of the contents. Boxes should record on the outside the weights and contents, as for instance:—

Twelve chickens .. .. Gross.

"The same applies to turkeys and ducks; in fact, the contents of cases must always be described on the outside.

"All poultry should be starved twenty-four to thirty-six hours before being killed, to allow for the complete assimilation of food, and in order that the gut may be cleared. After killing, the bird should be put into a chill room at about 40 deg. F., certainly not at a lower temperature. When thoroughly cool, they must then be graded, packed in boxes of twelve or twenty-four, then placed in freezer at a temperature of zero, until thoroughly frozen, when they can be stored at a temperature of 15 deg. F.

"The best selling chickens and fowls are those weighing from 2¾ to 4½ lb. each. Avoid sending those showing signs of spur. White Leghorns and breeds of similar size are useless. What is required is a chicken with a good breast and well fatted. If poultry is not meaty, though the desired weight, they will be rejected as secondary goods. All poultry should be 'bled.'"

Readers of the "Journal" may remember that in the year 1905 the Department forwarded a shipment of poultry to London, per s.s. "Damascus." In that market the prices obtained for the consignment were as follows:—Ducks, 2s. 6d. to 2s. 9d. each; best chickens and capons, 3s. 3d. each; turkeys, 7d. to 9d. per lb. Compared with prices then obtainable in Queensland, the London returns were very encouraging, in view of the fact that the ducks were not really as good as could be sent; that the chickens, although good, were not of a class that could be sent regularly, not having been bred specially for export, nor specially fattened; and that the turkeys were almost out of season.

The Department then announced that it was prepared to receive, during December, January, and February, chickens and ducklings for export to London, and full directions were given as to the class of birds required.

A second shipment was sent away by the steamer "Orient" in 1906, numbering about 300. The birds arrived in good condition and the packing, carried out in Brisbane by Mr. Fern, at that time Poultry Expert to the Department, was satisfactory. The London agent urged the importance of grading fowls and ducks. One or two fowls in a box might spoil the sale of the lot. If this were attended to, he considered that Australian goods properly put up would always command the market against American and Russian.

The latter country is now, and probably will be for some years, out of the market. Prices, as given by the Smithfield merchants, compare, notwithstanding the war, favourably with those ruling in 1905, and as the number of poultry farmers has of late greatly increased, there should be little difficulty in arranging a trial shipment in December next (should ship space be available), which would give time to poultrymen to prepare birds of the right class, such as buff orpington and wyandotte chickens. Black-legged fowls are stated not to be popular.

We do not, however, think that there is any likelihood of shipments of Queensland poultry to England, in view of the good prices obtained locally, even for inferior birds, without any cost to the farmer in the way of freights, preparing, and packing the poultry, &c. Added to this, poultry of all kinds are not as yet sufficiently numerous to allow of regular shipments. Ten years ago the Government Statistician set down the numbers of different fowls as follows:—

Fowls	652,411
Ducks	24,121
Geese	8,372
Turkeys	24,035
Other Fowls	1,379

The latest returns are—

Fowls	939,602
Ducks	53,916
Geese	7,240
Turkeys	21,041
Other fowls, including Guinea fowls	2,349

Fowls increased by 287,191; ducks, by 29,795; whilst geese decreased by 1,132, and turkeys by 2,994.

Of all classes of poultry, there are, in the State, 1,024,148 head. The population of Queensland numbers 700,342 persons; thus the number of fowls per person is 1.46.

In reference to the proposal to establish an export trade in Australian poultry, Sydney "Poultry" (28th June), whilst expressing some doubt as to the practicability of developing a profitable trade in the export of eggs from Australia to England, considers that there is apparently a good opportunity at the present time for the shippers of table poultry, chiefly by reason of the entire absence of Russian fowls from the London markets. In pre-war times the United Kingdom used to absorb enormous quantities of poultry from Russia, the supplies from that vast territory largely influencing prices, and it is considered by some authorities in England that very little poultry may be expected from either Russia or other Continental countries for a considerable time to come. In England, the average pre-war price obtained for chickens and fowls was about 10d. per lb. The present rates for poultry per lb., as controlled by the Government, are as follow:—

	s.	d.
To the Wholesaler.		
Chickens	1	10½
Turkeys	1	10½
Ducks	1	8
To the Retailer.		
Chickens	2	2
Turkeys	2	2
Ducks	1	10
To the Consumer.		
Chickens	2	8
Turkeys	2	8
Ducks	2	3

These rates, despite their somewhat inflated character, will, it is believed, be maintained for some time after the control of prices is removed, but will ultimately come down to about 1s. 6d. per lb. to the wholesaler. That was the impression in London trade circles about two months ago, and is probably based on good information. On the other hand, we have lately read a good many reports of big supplies being available, both from Russia and other countries ravaged by the war, as soon as peace prevails and the resumption of trade is possible.

Meantime, of course, English poultry-raisers are enjoying a boom, which is also participated in by China and the United States, both countries sending big supplies to the United Kingdom. The Americans, with their accustomed keenness in exploiting promising markets, have gone to great pains in placing their products before the British public, the result being that a decided prejudice exists at present in favour of Uncle Sam's poultry, which are killed, graded, packed, and placed on the market in a manner leaving absolutely nothing to be desired. The Australian exporter is, therefore, up against keen competition, and must recognise that, even if the market

on the other side is receptive and the rates profitable, he must supply poultry of the highest quality only, and prepared and packed in a way that will commend the product to the exacting purchaser on the other side. If Australian poultry should unfortunately, through the blundering or slackness of the exporters, suffer by comparison with similar imports from America, or elsewhere, there would be but a poor prospect of anything like a considerable or profitable trade being developed between this country and the United Kingdom.

HINTS FOR AUGUST AND SEPTEMBER.

By J. BEARD, Poultry Instructor.

Without doubt, August and September are the busiest months in the year in the poultry business, for chickens should be plentiful, which tends to make any farm look lively, and provides plenty of work. This month is the time to hatch out birds of all the heavy varieties, and next month for all the light varieties for the early autumn laying, and they should be hatched out with all speed. From a commercial point of view, I have no time for chickens hatched in October or November, for it is simply a waste of capital and labour.

I know that many pens are not mated up at present. This should be done without delay, and after seven days the eggs should be fertile. Get these down with all speed, so as to have some chicks out early. The idea of not hatching because food is dear, or that sales will be slow in consequence, is incorrect and is not the right way of looking at things. Owing to the high price of red meat, table poultry are bringing high prices, and these are likely to continue for a considerable time.

With food at such high prices, there must be economy in its use, and while only the best should be used, care should be exercised in feeding. To get the best results from the birds, the proper ration must be given to supply enough nourishment and to make the eggs, otherwise there must be a loss. It is false economy to give a starvation diet which will only keep the birds alive, for then the egg basket is left empty, and there is no income from this source. For the morning feed, give a good mixture of soft food, and in the evening, good sound wheat, and where birds are on dry runs, or in intensive houses, let them have some green food at mid-day. Fowls so confined might have some soft food, but only in small quantities, or a little round wheat amongst the litter to keep them scratching, though occasionally a feed of maize may be given, but not in great quantity, as this will cause the birds to become internally fat. Just now this grain is very expensive, and at any time should not be given in large quantities, it being thrown down in the litter and buried, so that the birds have to work for it. The scratching provides exercise and reduces the fat, which would otherwise accumulate and stop the egg supply. Fat hens cannot possibly lay, and to get the most out of them they must be kept in a useful store condition.

Another essential thing is grit. So many birds fail to perform their proper functions through lack of the necessary means to masticate their food properly. The grit grinds it up and make it more easily digested. From this it will be seen that only sharp, hard grit is any good, because all soft stones soon loose their sharp edges, and at once become useless. Broken flints and crockery are best, and though they may cost a little more at first, they are by far the cheapest in the end, lasting much longer and being more effective in their operation.

When feeding breeding pens, see that all birds get their proportion of food. Sometimes the male will not feed with the hens, but will run round, calling them, without eating at all, and before many days are over is completely run down and useless for fertilising the eggs. This would account for many weak germs if only an examination were made. The male need not be fat, yet he requires a certain amount of food to keep him right, without which he cannot carry out his duties. If there is any doubt on this score, watch him when food is given, and if he will not eat eagerly, put him in a run alone and feed repeatedly, or just drive the hens into the house and give him an extra feed in the run after the ordinary meal has been supplied. The vitality of all breeding stock must be maintained, or the progeny will suffer in consequence.

See that all the breeding houses are properly ventilated and not over-crowded. Cold will not hurt fowls so much as wind and rain. Thus, while keeping them free from draughts, see that they are kept dry and get plenty of ventilation. If the front of the house is sheltered it may be left quite open, but there must not be any cracks at the back through which the wind can get in or blow between. Yet it is essential that the space between the top plate and the iron at the back of the fowl-house should be left open to cause a top draught to enable the escape of any foul air that would otherwise accumulate.

THE MUSCOVY DUCK.

By R. T. G. CAREY, Beerwah.

REARING.

Upon this subject many country folks and town fanciers write me, "What is the best method to rear muscovy ducks?" To those I thus pen as follows:—

The greatest service in this work is rearing the stock from infancy to maturity. Whether it is to be for market, breeder, or exhibition, either branch requires the utmost care from the commencement. They must always have dry housing, as damp house proves fatal. The muscovy ducks do not perch or roost like fowls, but squat on the ground; therefore the camp must have a bedding of some dry grass, hay, or leaves laid down, so that their feet can be kept warm (that seems strange, but 'tis true; nothing gives cramps or muscular rheumatism quicker than damp floor and cold feet to these birds). The duckhouses or brooding quarters need not be of elaborate construction, but just sufficient space should be provided to accommodate the number desired in each quarter comfortably. Avoid overcrowding. Have the houses windtight with rainproof roofs, and leave the whole front open. A yard 30 ft. by 30 ft. is the most suitable.

When a batch of ducklings comes out, which usually is about in twenty days, drive the mother with her young to the brooding-quarters for about three or four weeks; then let them get on to range, where they'll gather natural food, such as insects, grubs, grass-seeds, and grit which they do enjoy. They like the freedom.

In fine weather and throughout the summer, it is very important that the ducks are let out to range early.

The artificial rearing is more intricate after incubation. You have to provide the heat to foster-mother; see that it is regulated, and when seeing to the lamp, perform any other duty that recommends itself just then. The most important items are warmth, cleanliness, fresh air, and judicious feeding, but "more brains than grains" is needed when feeding ducklings that are foster-mothered. After fourteen days to a month, separate the sexes. Rear and feed in the following manner:—Give just what can be eaten up clean of a nice mash of bread crumbs, bran and pollard, mixed moist with sour milk.

Water must be ever in front of them—but not sun-warmed. Always keep it in the shade, ever clean and fresh. Shade must either be natural or artificial for the muscovy duckling quarters, inasmuch as these young ducks do not feather on their backs, as do other fowls, until having prepared their breast, sides, and leg feathers. So the shading saves the thinly-covered backs from being scorched or scalded by the fierce sun's rays.

From the fifth or sixth week, muscovy ducklings should have a fair range to roam over, but not so large as will expand their force, necessitating their devouring more food to attain same results, by which time they have grown to full size.

Now a different system must be enforced. The frame thus built up must now be covered with flesh. Forthwith a period of semi-liberty or confinement comes into vogue, or a state of laziness encouraged. These ducklings, for market fattening, are now penned up, about twenty birds to each pen. The pens are usually 20 ft. by 30 ft. of roomy and lofty shed, with plenty of fresh air, well bedded with dried material, hay or leaves.

The quantity of food is gauged by their appetites (full and plenty), but avoid waste. In this stage no water must be supplied until they have finished eating. They are then brought on to the final stage, and afterwards marketed.

A NEW APPLE.

Victorian "Fruit World" (1st July) says that a new apple is quoted in English exchanges. The name is "Arthur Sheed," and the description is as follows:—

"Russet, suffused with golden and red colouring, medium to large in size, of superior quality for cooking or table use; season, October to March (or April to September, in Australia). The tree is a good grower, constant bearer, and very heavy cropper."

Particulars obtainable from Mr. Robert Holmes, Tuckswood Farm, Norwich, England.

Dairying.

FEEDING DAIRY COWS.

A cow may inherit the best of constitutions and milking capabilities, but the value of these will depend on the conditions under which she exists. Not only is it impossible for her to make something out of nothing, but her profit at the pail will be in proportion to the judgment exercised by her owner in those matters which directly affect her yield of the day or the season. Knowledge and care in feeding must accompany skill in breeding, or the latter will be of little service. A very large proportion of the food of the cow is grown on the farm, and of this, again, no small share is consumed in the growing state, or as green fodder, hay, or silage. Other foods, whether home-grown or imported on to the farm, properly take a second place in the inquiry. The pastures must first be considered, and we may briefly consider in what ways they may, in turn, affect the milk. The "land" and the "herbage" are commonly blamed for most failures in dairy work, the true causes of which are either unknown or inconvenient to confess, and it is certain that their influence has been greatly exaggerated. The soil itself—*i.e.*, the product of the rock—can only reach the milk by the soluble minerals which pass into it by way of the food and blood. The proportions of phosphate-making materials vary greatly in different plants, and somewhat, even in the same plants on different soils, according as these soils furnish them abundantly or in lesser quantities. There may be, therefore, an unexpected excess or deficiency of Ca salts in the milk brought from any pasture or from the hay made therefrom, and other foods—having all come from some soils may exert a similar influence in their various degrees. Milk so affected will behave differently in manufacture, and the subtle quality which rules its behaviour may be properly called "character." This, then, will vary with the soil; and it may be readily admitted that wherever the variations are not recognised, and an unchanging line of practice is blindly followed in the dairy, inferior and irregular results will follow. When, however, our eyes are once opened to the facts, and we are able to trace the influence of the soil on milk character, it is but a step to the possession of the knowledge which shall enable us to conquer the difficulty.

What the influence of the other alkaline salts may be is not yet fully known; but, so far as can be judged, it is, at most, small in comparison with that of the calcic phosphate, and covered in the dairy by simple changes in details of management.

When we turn to the herbage, we find other sources of difficulty awaiting us. The plants which may be considered good for feeding cows will give us no trouble; but these are commonly associated with others which are mischievous. The true grasses and leguminous plants may cause changes in milk quality by their many mixtures, proportions, and growth, but they will not interfere with the dairy processes, or give to the products ill qualities. The miscellaneous plants, which may all be considered weeds, include some which are dangerous to the health of the cow; others, more numerous, which flavour milk undesirably, and a few which colour milk, or produce irregularities. To these causes of mischief must be added those arising from plant diseases of a fungoid nature.

Do cows eat any appreciable proportion of such plants? The occasions known may be few in which the mischief is recognised, and traced to some particular plant; but such do occur often enough to make the matter one of importance, and a considerable amount of harm is done daily by such weeds as are incapable of giving a distinctly bad flavour to milk, but, in their many kinds, combine to give one generally inferior.

What is the cure? Clean pastures. If a weed is a pest in a cornfield, it is a much greater one in the case before us, where it not only takes the place of a better plant, but hinders the superior growths around it, but actually does direct damage to the dairyman's goods. There are few pastures which can keep sweet and free from such trouble by the mere force of natural conditions. Draining and manuring can do much in reducing the miscellaneous plants to small numbers, and the more innocent kinds, and a constant war against them should be maintained. Weeds are as harmful in hay as anywhere, and good hay can only be made from good pastures.

Silage is a valuable form of cattle food. It tends to increase milk, but unless well made from the best materials it will reduce the quality, and if badly made, should not be used for milking stock at all.

Cereals, whether fed green, in the ear, or fully ripened, as threshed grain or straw, are valuable in their various ways, and under proper conditions only affect milk by their variations in feeding value.

Certain succulent foods, such as cabbage, rape, turnips, swedes, mangolds, carrots, and parsnips are much employed in European countries and in America, and in reasonable quantities are useful as foods, but, with the exception of the two last, affect the flavour of milk, and its products in some degree, injuriously.

The same is true of brewers' grain and distillers' refuse. Meals and cakes of various kinds are much used, generally with more bulky foods, and with good effect on the quality of milk. The meals of peas and beans are in great favour with some feeders in Europe, while maizemeal is used for its fat, ranging from 4.5 to 5 per cent. Either will increase the quality of milk. Linseed meal has the same tendency, and is especially useful in feeding calves, while cotton seed is credited with an increase in butter production.

By-products of the milk, such as bran or wheat, &c., and the cakes made from pressing oil from linseed, are generally good for milking stock.—"Milk, Butter, and Cheese," by J. Oliver.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE, 1919, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1919 AND 1918, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1919.	June, 1918.
North Coast.	In.		In.	In.
Atherton	1·61	18	1·28	0·19
Cairns	2·76	37	2·21	0·38
Cardwell	2·05	47	1·30	1·14
Cooktown	2·03	43	1·47	1·33
Herberton	0·96	32	0·81	0·05
Ingham	2·39	27	0·28	1·05
Innisfail	7·00	28	8·23	3·99
Mossman	2·23	11	1·86	0·29
Townsville	1·31	48	0·34	0·05
Central Coast.				
Ayr	1·32	32	0·79	0·04
Bowen	1·61	48	2·69	0·07
Charters Towers ...	1·40	37	0·20	0·01
Mackay	2·70	48	1·61	2·04
Proserpine	3·70	16	2·84	0·48
St. Lawrence ...	2·48	48	0·83	0·70
South Coast.				
Biggenden	1·83	20	0·04	0·05
Bundaberg	2·74	36	0·13	0·02
Brisbane	2·56	68	0·78	0·20
Childers	2·18	24	0·07	*nil*
Crohamhurst ...	4·13	25	2·40	0·27
Esk	1·95	32	0·86	0·42
Gayndah	1·80	48	6·08	*nil*
Gympie	2·47	49	0·81	0·02
Glasshouse M'tains	3·67	11	1·16	0·58
Kilkivan	1·93	40	0·56	*nil*
Maryborough ...	2·82	48	0·67	*nil*

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1919.	June, 1918.
South Coast—continued:	In.		In.	In.
Nambour	3·26	23	1·41	0·21
Nanango	1·91	37	0·70	0·28
Rockhampton ...	1·99	32	0·87	0·12
Woodford	2·56	32	1·00	0·34
Darling Downs.				
Dalby	1·62	49	0·07	0·25
Emu Vale	1·35	23	0·02	0·29
Jimbour	1·58	31	0·10	*nil*
Miles	1·91	34	*nil*	0·05
Stanthorpe ...	1·77	46	0·30	0·67
Toowoomba ...	2·30	47	0·79	0·54
Warwick	1·60	32	0·19	0·48
Maranoa.				
Roma	1·65	45	0·70	0·02
State Farms, &c.				
Bungeworgorai ...	1·19	5	0·49	0·02
Gatton College ...	1·58	20	0·40	0·22
Gindie	1·59	19	0·09	*nil*
Hermitage ...	1·85	13	0·11	0·91
Kairi	0·70	5	1·27	0·13
Sugar Experiment Station, Mackay	2·33	22	1·56	2·40
Warren	1·33	5	0·15	0·28

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year, and for the same period of 1918, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

Horticulture.

GROWING STOCKS: OLD *v.* NEW SEED.

In the year 1765, an anonymous writer wrote as follows on Stock seed:—

"Many amateur and professional gardeners are certain that Stock (Giroflée) seed kept for five or more years give a larger percentage of doubles than fresher seed. Taking for granted that this is really a fact, the reason is that the seeds which can only produce single Stocks decay, losing their germinative power sooner than the others. So old seed will, in fact, produce fewer plants, but of the plants produced there will be a greater percentage of doubles."

How far can we now believe this statement made as long ago as 1765? According to traditional belief, it is better to use, for some vegetables and flowers, seeds from two to five years old. Why? Old gardeners say that new seeds produce plants less shapely, running more quickly to seed, and of such vigour, that they do not preserve all their true characteristics, while seeds two or three years old give more shapely plants, with less tendency to run to seed. It is possible to explain this? All plants, or, at least, most of them, have the power of reproducing themselves from seed, with their own characteristics, but, at the same time, they are influenced by atavism, which tries to make them revert to the specific types from which they came. Thus, in the seed of some varieties, two forces struggle, the one tending to make them revert to the primitive type, the other tending to reproduce certain acquired characters more or less fixed by selection. It is possible that this atavistic force weakens with the age of the seed, as also that abnormal vigour which makes certain plants run to seed if grown from seeds too fresh when sown. This is not the case with stocks. If we admit that double flowering of these plants is a weakness of degeneration, it is easily believed that seeds some years old no longer possess their pristine vigour, and can produce a double flower instead of a single. We have here a real transformation of the seed, a transformation which can be allowed if we remember that the less stocks are let run wild the more chance one has of obtaining double flowers. It is for this reason that stocks are grown in pots in Germany. In this way a much larger percentage of double flowers is obtained than in the case of plants grown in the open. Many growers prefer to use China Aster seed one or two years old, saying that by so doing they obtain more double flowers.

But above all, it is in the kitchen garden that it is necessary to know whether to choose young or old seed according to the species or variety. Thus, for beetroot and carrots, seed two years old should be used to let the root form better and keep the plants from running. For cabbages, three-year-old seed should be used, as then the plants will shoot and ripen better. If we do not wish to let spinach, lettuce, or radish run to seed, or differ from the type, we must use two-year-old seed. In the British "Good Gardener," gardeners are recommended to sow melon seeds several years old, and the same rule applies to cucumbers and all other *Cucurbitaceæ.*

The influence of time on the germinating value of seeds appears, then, to be a well established fact.

[Some years ago we sowed some broad beans. A portion of the seed was left over and forgotten for three years. These seeds were then sown, and the result was a splendid crop of beans, the haulms measuring 3 and 4 ft. in height.—ED.]

IMPORTANT ENGINEERING AMALGAMATION.

The fusion of the extensive engineering interests of Ruston, Proctor and Co., Limited, of Lincoln, England, and Richard Hornsby and Sons, Limited, of Grantham and Stockport, England, Melbourne, Sydney, and Brisbane, is announced. The amalgamation is a noteworthy one, embracing as it does two of the most important and well-known engineering firms in the world.

The works of Richard Hornsby and Sons, Limited were founded in 1815, and those of Ruston, Proctor and Co., Limited, in 1857. Both were commenced in a very small way, the first-named for the manufacture of agricultural implements, and the latter being a millwright's business. From their inception they progressed rapidly, developing into huge establishments, with factories occupying many acres of ground, and employing thousands of workpeople.

The "Hornsby" oil engine, so well known in Australia, was the first of its type in the field. In 1897 the gold medal of the Victorian Gold Mining Exhibition, held in Melbourne, was awarded to the "Hornsby" oil engine, and since then "Hornsby" engines have gained many high awards wherever exhibited throughout Australia, including gold medals at Bendigo and Warracknabeal.

"Ruston" engines and machinery are also very popular in Australia, their portable steam engines and threshing machinery being found in all parts of the Commonwealth, whilst excavating machinery of "Ruston" manufacture has been extensively imported.

During the war period the respective works at Lincoln, Grantham, and Stockport were adapted to the Empire's requirements, and their output of practically every class of war material reached colossal figures. The new firm proudly claims that they were represented by their work on every battle front, in the Grand Fleet, and in the air, and that they were tendered letters by the Imperial Authorities, complimenting them upon the outstanding character of their work, and also upon the phenomenal output of aircraft and aero-engines.

The new firm will in future be known as Ruston and Hornsby, Limited, with branches at 360-362 Queen street, Brisbane, Melbourne (Head Office for Australasia), and Sydney, and agencies exist throughout the Commonwealth and New Zealand.

DROUGHT PRECAUTIONS SCHEME.

A scheme, having for its object the prevention of practically all the usual losses in Queensland flocks and herds in times of drought, has been briefly outlined and submitted by Mr. P. J. Murphy to the United Graziers' Association of Queensland for the earnest consideration of that body.

The scheme, though extremely simple and brief, will, if carried into effect even in a modified form, have very far-reaching results, as it will not only set the pastoral industry on a sound and permanent basis, but will also create unlimited opportunities for profitable farming in all Queensland coastal districts.

Mr. Murphy states that the adoption of the scheme in some form is inevitable, as it is inconceivable that things should remain as they are for any length of time in Queensland.

The scheme provides for the storage of maize and trussed hay (such as wheaten hay) of the very best quality, and for a continuous standing guarantee of a profitable minimum price to the farmer for these two lines of farm produce. By "storage" is not meant the handing over of good farm produce to the rats, mice, and weevils, as happened to the Southern wheat in war time.

That means are now available by which maize and hay of the right quality may be safely stored for very prolonged periods has been proved beyond doubt—thanks to American brains—and that storing produce of the right quality is a financial success has been proved many times over, even by produce agents in the cities.

Mr. Murphy points out that under such a system, provided importation were stopped, the production of maize and hay of good quality would go on increasing indefinitely in Queensland; but there would never be a surplus, as the flocks and herds, as well as the number of pigs and poultry, would increase in proportion.

"Under our present system (or want of system) which is a very ancient and ridiculous one," says Mr. Murphy, "we have an apparent surplus of maize and hay in good seasons; the farmer is laughed at in the markets, and he cannot sell his produce, even at a loss. But the inevitable reaction results in a shortage next year, and then, to make matters worse, we try to kill the goose that lays the golden eggs—the farmer—by importing maize and hay; and then—perhaps the drought."

Finally, Mr. Murphy advocates the proper and scientific storage of immense and unlimited quantities of Queensland-grown maize and hay in the vicinities of Brisbane, Rockhampton, and Townsville, and that those products should be handled mechanically in 10 or 20 ton parcels, and be available for despatch to any part of Queensland at an hour's notice.

This is evidently one of the greatest—if not the very greatest—post-war movements which this State can undertake, and the sooner something is done in this direction the better.

The Orchard.

GRAPE FRUIT.

CITRUS DECUMANA, LINN.

H. W. Mobsby, F.R.S.A., our Departmental Artist and Photographer, whilst on an official visit to Palmwoods with Inspector Sherry, visited an orchard belonging to Mr. P. G. Thelander, who said, approaching a tree bearing a type of citrus fruit in bunches: "Mr. Mobsby, you have had experience with the grape-fruit in California, U.S.A. Have a look at these," and after sampling, on Mr. Mobsby's telling him of the popularity of the fruit in America as a breakfast fruit, and how it ought to be made popular in Queensland, Mr. Thelander, who had thought of cutting out the tree, said he would let it stay where it was and take care of it, and also help to introduce it to the Queensland market more than it had been, so that the people might get the habit of eating the grape-fruit at breakfast, for there is no more appetising and system-toning food than ripe grape-fruit in its natural state, nor any more refreshing drink than that made with the juice of a ripe grape-fruit.

Health authorities agree that grape-fruit and oranges help sick people to get well, and those in good health to keep well.

An American journal, "Saturday Evening Post," says:—

"Domestic science experts join in commending the more liberal use of grape-fruit and oranges as a means of household economy.

"Miss Mary Arline Zurhorst, principal of the National School of Domestic Art and Science, says: 'We thoroughly endorse a more extensive use of citrus fruits, such as grape-fruit and oranges, by those interested in a pleasant road to perfect health and economy in spending household funds.'

"Mrs. Caroline L. Hunt, of the Home Economics Service, Department of Agriculture, says: 'Fruits like grape-fruit and oranges should be served to children in some form every day. They cost less and are really better than solid foods.'

"Dr. Wm. Gerry Morgan, the widely known stomach specialist, of Washington, D.C., says: 'Take grape-fruit at the beginning of breakfast to stimulate the appetite, and to help the stomach begin its work. Grape-fruit is the most valuable of all fruits for the majority of people.'"

The illustrations show—

1. The tree.
2. A bunch of eleven fruits.
3. The way to cut and serve the fruit for breakfast.

Mr. Morris, of Kew Gardens, who some years ago visited Jamaica, delivered an address, in which he spoke of the grape-fruit as follows:—"Amongst citrus fruits, there is no fruit which appears to be in greater demand and obtains such high prices as the grape-fruit. This is a variety of the shaddock or pomelow. It is so-called because it grows in clusters, as in a bunch of grapes. On account of its tonic properties it has lately come into great request in the American market. The most esteemed sort is of a good size, with a pale-yellow, polished rind. Grape-fruit should be allowed to get thoroughly ripe on the tree. Immature fruits are of an inferior flavour. The tree, when budded, is a vigorous grower and very prolific. It is recommended to bud either on the sour orange or rough-lemon stock. Provided the fruit is full-juiced and of a delicate flavour, the larger sizes are more in favour than the smaller ones."

In the sixties, the editor of this journal planted an orangery at Oxley Creek. The trees were imported from Sydney, and when they fruited amongst them was one tree which bore oranges in clusters, as depicted here. It was supplied under the name of the "cluster" orange. This was undoubtedly the first grape-fruit planted in Queensland.

In an early number of the "Journal" (1897), we published the following note on the value of the Grape-fruit:—

"Jamaica produces some kinds of oranges which, under the name of 'Paradise fruits' or 'Grape-fruits,' are sold at wonderful prices in New York. In 1896, the United States absorbed £20,000 worth of the Jamaica 'Grape-fruit' oranges. Two barrels were sold in New York at £5 each, and seven barrels of similar fruits sold in Philadelphia for £5 10s. each. These oranges would be retailed at about a dollar apiece (4s. 2d.). The most valuable orange in Australia has never approached such a value as this. The properties of the 'Grape-fruit' appear to be medicinal, as a tonic and febrifuge."

As far as is known, this class of orange has not been grown by Queensland orchardists, except in the cases abovementioned.

Plate 4.—Grape Fruit grown by Mr. P. G. Thelander, Palmwoods.

Entomology.

INSECT PESTS OF THE ROSELLA.

THE ROSELLA FLEA-BEETLE.

(Nisotra breweri. FAMILY.—*Chrysomelidæ.)*

BY EDMUND JARVIS, Assistant State Entomologist.

The family Chrysomelidæ comprises a vast assemblage of small plant-eating beetles, usually found resting on leaves, the majority of which are brightly coloured, many species, indeed, being splendidly metallic and classed among the most beautiful of coleopterous insects.

Several of our Queensland chrysomelids are more or less injurious, such as pumpkin and potato beetles, to say nothing of various other kinds that injure the foliage of fruit trees, grape vines, sugar-cane, &c.

Flea-beetles, as the name implies, are of insignificant size, and further characterised by having their hind legs formed for leaping, the femora or thighs being very noticeably thickened to provide for this additional muscular energy.

The species under consideration furnishes another illustration of the trouble likely to arise when indigenous insects chance to acquire a decided taste for introduced plants.

In the present instance it is perhaps not surprising that this beetle should have found *Hibiscus sabdifera* more attractive than its own native food-plant, *Commersonia echinata*, Forst., since rosella leaves probably have a fruity flavour, and, being also more succulent than those of the latter species, would afford an abundant supply of moisture during very hot weather.

THE EGG.—Although writing for the man on the land, it has been thought advisable to deal rather fully with the question of oviposition, as the knowledge obtained regarding the physical structure, number, and whereabouts of the eggs is of scientific value, and will enable growers to effectually control this pest by means of simple cultural methods.

The eggs are golden-yellow, elongate-ovate, measuring 0.90 by 0.30 mm., the chorion being somewhat coriaceous in texture and coarsely tuberculate (Fig. 5).

They are deposited in damp soil at a depth varying from ¼ to ½ in., either singly or in batches of from two to eight.

In breeding cages, where the earth was moist throughout, single eggs were occasionally found on the surface, but even in such instances the majority (about 80 per cent.) were placed from ⅛ to ⅜ in. below ground level.

The female beetle crawls beneath the loose, dry, surface soil until reaching suitable damp conditions in which to oviposit, such action resulting after a time in the elytra becoming stained and otherwise disfigured.

A specimen, after laying 198 eggs in confinement, had its wing-cases nearly covered by a thin crust of hardened earth, upon which a white mould had started to grow.

This beetle, however, lived 34 days longer, laying 73 more eggs. (See table giving details of oviposition.

Eggs deposited under soil in cages hatched in from eight to ten days, but when kept on top screened from wind and exposed freely to the air commenced to shrivel after five days, and on the seventh collapsed, becoming flattened, although still retaining an oval outline.

They were killed by exposure to direct sunlight for about three hours at a temperature of 106 degrees Fahr. Individual female specimens captured outside oviposited freely when placed in cages.

A single example, however, will suffice as a record of the average number of eggs deposited every few days by one of these beetles.

The specimen in question may have oviposited prior to capture, so that the 271 eggs included in the table below perhaps falls short of the full number laid by a single flea-beetle under normal conditions.

EGGS OBTAINED FROM A SINGLE FLEA-BEETLE, CAPTURED 21ST MARCH.

April: Dates of Examination.						May: Dates of Examination.						Total No. of Days.
8	15	19	23	26	29	5	10	15	20	28	31	68
Number of Eggs in 40 days.						Number of Eggs in 28 days.						Total No. of Eggs.
65	40	37	20	18	18	35	3	27	5	3	0	271

It thus appears that during April this species deposits on an average thirty-three eggs every six and a-half days, or about five a day; while during the month of May, when the weather is decidedly cooler, the number is reduced to five eggs every forty-eight hours.

LARVAL STAGE.—The young larva a day or so before hatching is plainly visible as a bright yellow blotch at one end of the egg, the chorion surrounding the unoccupied portion showing distinctly whitish.

It emerges through a longitudinal rent in the side, leaving the empty shell practically unaltered in form.

Viewed with a lens of moderate power, these tiny larvæ may easily be observed crawling quickly among the particles of soil, and at this critical stage of life are doubtless, like many other species of the class INSECTA, endued with special powers of activity and endurance to enable them to locate suitable food.

Towards the end of the first moult the body is pale yellow, the head, prothoracic, and anal plates darker, and with a series of transverse elongate, dull-fulvous blotches on all other body segments.

Anal plate and proleg large, the outer angle of former rounded, the borders blackish, emarginate, edged with six long dorsal hairs.

Subdorsal tubercles and dorsal blotches supporting short white glandular hairs. Length, at this stage, 3.50 mm. (Fig. 10).

Just prior to pupation the fully grown larva, which measures about a-quarter of an inch, contracts, until about 5 mm. in length, assuming a bloated cylindrical form.

The anal-plate is then distinctly narrower than the diameter of the body, and the proleg unobtrusive.

The general colour at this stage is a uniform dirty white, the head reddish-yellow.

From the time it starts feeding, but more particularly during the last stadium, it has a habit of doubling up hook-like when alarmed and remaining rigid and motionless for several seconds.

THE PUPA.—General colour creamy-white; anal segment tipped with two spines; body supporting a few scattered hairs as shown in Fig. 9.

A day or so before transforming into the imago the wing-cases change to smoky brown, the eyes from brown to black, while the shape of the mandibular teeth appear in distinct reddish outline.

Transformation is complete about a couple of days later, the elytra being at first pale yellow with pearly lustre, but after a few hours darkening to steely-blue.

THE BEETLE.—Body ovate, dark, shining, steely-blue; thorax, scutellum, legs, and antennal joints 1 to 5 light reddish-yellow.

Ventral surface of abdomen and metathorax reddish-black. Eyes, and joints 6 to 11 of antennæ blackish, the latter gradually thickened towards the tips (Fig. 8).

Mandibles yellow, each composed of two large lateral teeth and three small ones (Fig. 3); labrum rectangular; labium narrow, elongate; maxillæ small, lacinia spinescent; (Figs. 7, 6, 4, respectively).

Elytra (wing-covers) with about 16 longitudinal carinations (observable only under a strong lens by reflected light), the intermediate spaces between them irregularly and more deeply punctulate than the pronotum. Marginal edges of elytra and pronotum slightly flattened horizontally. Pulvilli of tarsi clothed with white hairs.

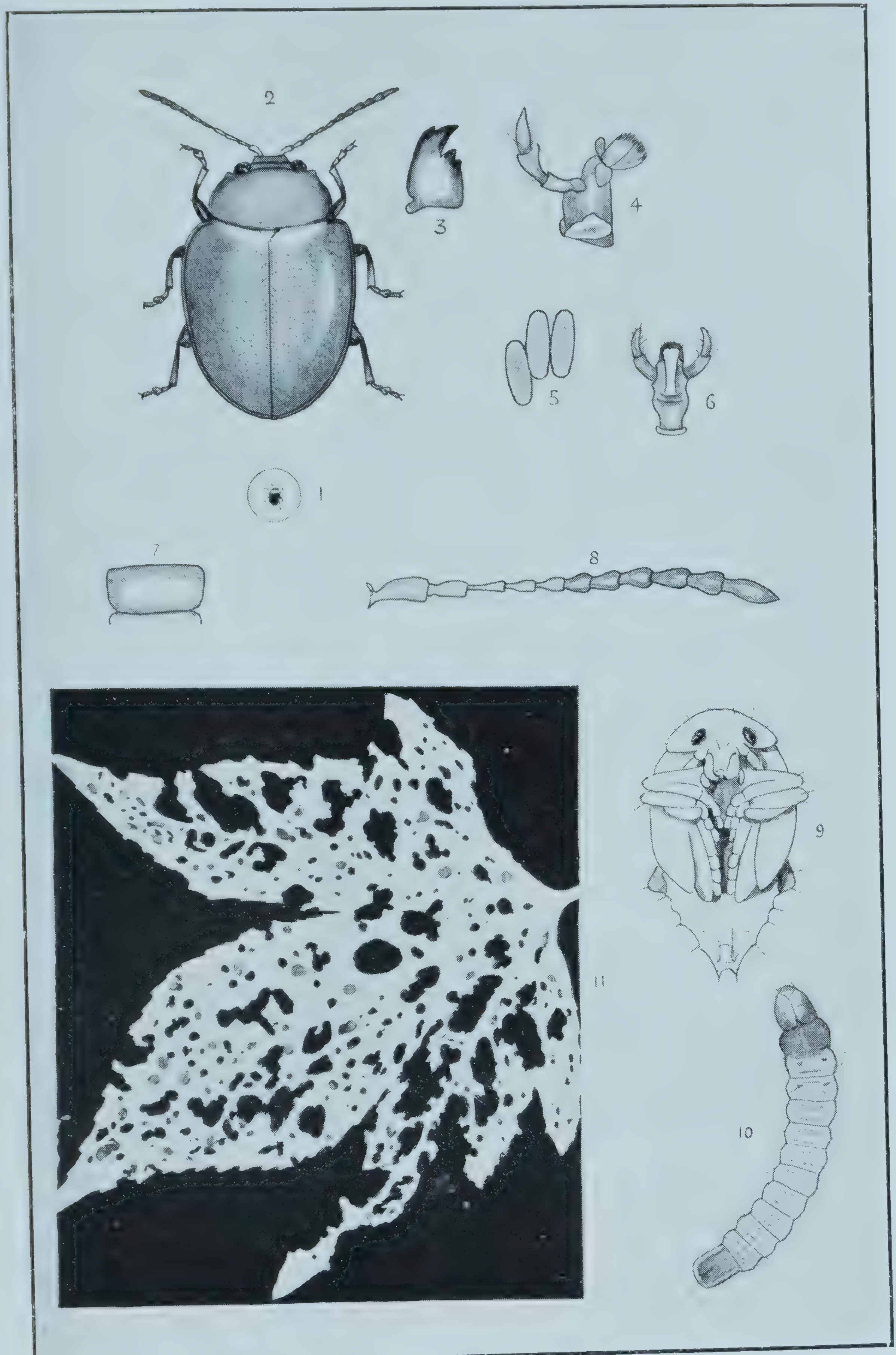

PLATE 5.—ROSELLA FLEA-BEETLE (*Nisotra breweri*).

1. Beetle (natural size). 2. Beetle (enlarged 12 times). 3. Mandible. 4. Maxilla. 5. Eggs. 6. Labium, or lower lip. 7. Labrum, upper lip. 8. Antenna. 9. Pupa. 10. Larva (all the above figures much enlarged). 11. Rosella leaf (natural size) damaged by *Nisotra breweri* and other beetles.

(All drawings original.)

Length and width of female 3.60 by 2.50 mm. (Fig. 1 natural size).

Habits of Adult Beetle.—During copulation the female of this species, whilst carrying the male and crawling on leaves, has a curious habit of wagging its body from left to right in a lively manner for several seconds.

Mated pairs confined in breeding-cages were noticed copulating again after intervals of one and ten days, so probably this species mates several times during the period of oviposition.

NATURE OF INJURY.—The accompanying photo. of a rosella leaf damaged by *Nisotra breweri* (Fig. 11) may be taken as a fair illustration of Flea-beetle attack. The large holes, &c., are the work of other beetles and caterpillars, the small ones being for the most part caused by the species under consideration.

In addition, however, to leaf injury, this pest sometimes materially checks plant growth by devouring the tender bark of young shoots, destroying at times areas sufficiently extensive to nearly girdle the stems. Wherever the bark or epidermis is eaten in this way the place turns brown, and similarly holes in the leaves become margined with a ring of dead tissue which renders them very conspicuous.

Both larvæ and pupæ were found in the soil close to the stems of affected plants, so in all probability subsist for the most part on the fibrous feeding-roots.

Although specimens confined in cages tunnelled and consumed the central portions of various succulent roots about ⅛ in. in diameter, brief examination of affected rosella bushes failed to reveal larvæ inside the larger roots.

It should be mentioned that in the wet season, when injuries to the bark and leaves caused by this beetle do not heal readily, affected bushes may suffer from fungus diseases, which flourish during damp humid weather, and are liable to invade the tissue of plants that, whilst trying to develop a large crop of fruit, are at the same time incurring loss of vitality from attacks of insect pests.

REMEDIAL MEASURES.—Like most flea-beetles, this species leaps with agility from the leaves to the ground if touched, and remains motionless until believing the danger past.

Fortunately, it does not take fright when closely approached, so that in the event of severe infestation the control method of shaking badly affected bushes over suitable tarred screens would prove very serviceable.

Upon the first appearance of this pest in large numbers the ground around the plants should be hoed at intervals to a depth of about 2 in., either with a small "Planet Junior" or preferably with ordinary Dutch hoes, as by using the latter treading on the freshly hoed surface is avoided.

Such treatment, in addition to killing weeds and conserving moisture, would probably cause a large percentage of the eggs to dry up, and, moreover, by loosening the soil particles, enable *Pheidole megacephala* and other ants to more easily reach and destroy both eggs and young larvæ.

P. megacephala doubtless operates at times as an important controlling factor in this connection, since these ants were found nesting in the soil about the main roots of nearly every rosella bush examined, having probably been attracted in the first instance by the supply of food in the shape of eggs, larvæ, and pupæ of *Nisotra breweri.*

Other remedies consist in dusting the plants at intervals, when the beetles are plentiful, with arsenicals, such as arsenate of lead mixed with an equal proportion of air-slacked lime, or spraying with vegetable insecticides, as decoctions of aloes, hellebore, &c.

CULTURAL METHODS.—*Hibiscus sabdarifa,* known in Jamaica as "Sorrel" or "Roselle," and belonging to the family *Malvaceæ,* is extensively grown in many tropical and subtropical countries, the fruit being usually considered a welcome addition to the table, owing to its distinctive sub-acid flavour.

From time to time our Editor has pointed out the advantages likely to be derived from a cultivation of this crop, and readers wishing to obtain full information on the subject are accordingly referred to the "Queensland Agricultural Journal" (Vol. VI., p. 371).

Whilst dealing principally with the entomological side of the question a few personal observations on the cultivation and rapid growth of rosellas in North Queensland may interest general readers.

A small sowing was made on 28th December on light-red volcanic soil of medium quality, ploughed for the first time the previous season. This patch had been planted with English potatoes, which failed to produce a good crop, owing to want of rain.

No manure was given, and after digging the potatoes the land was simply chipped over to a depth of about 4 in., levelled, and the seeds sown in drills.

The young plants were thinned to 9 in. apart, and by the middle of February had made bushes 18 in. high.

During this interval of seven weeks from date of sowing the weather was very hot, and one hoeing was given to kill weeds.

At the end of February the bushes were thinned to 4 ft., and heavy rain fell, succeeded by three weeks of intense heat.

The infestation by *Nisotra breweri* started in January, and doubtless had the effect of stunting plant growth, as every leaf was riddled with holes, and the beetles continued to feed unchecked throughout February and March. By 1st April, however, the plants were 3 to 4 ft. high and covered with flower buds which bloomed freely a couple of weeks later, and by the end of April (only four months from date of sowing) every bush was loaded with fruit.

Thinnings that had been transplanted in February suffered considerably at first from flea-beetle attack, but shortly after cultivation of the surface this pest was less in evidence, although present in fair numbers on the bushes until the middle of May.

ADDITIONAL INSECT PESTS OF THE ROSELLA.

Apparently the various insects known to affect this plant in Queensland are of minor importance.

In the south, near Brisbane, an aphis and one or more kinds of sap-sucking bugs are commonly met with on the fruit and young leaves, but do not, as a rule, occasion noticeable injury.

Nisotra breweri is the only really destructive insect encountered by the author in North Queensland up to the present, although the following species also occur more or less harmfully on the foliage of rosellas at Meringa:—

LAGRIS CYANEA, Macl. (Order *Coleoptera;* Family *Lagriidae.*)

Specimens of this beetle were observed to be constantly present on rosella bushes, eating holes in the leaves.

It is a beautiful insect, about five-sixteenths of an inch long, of a uniform shining peacock-blue or bronze colour, tinged with iridescent purple, roughly punctured, and sparingly clothed above with short white hairs. The head and thorax are of about equal width but proportionately much smaller and narrower than the rest of the body.

Antennæ yellow, with joints 7 to 11 blackish. Legs red, tarsi, basal half of tibiæ, and distal ends of femora black.

This beetle occurs freely throughout forest country around Cairns on a variety of native plants, but at present does little or no damage to cultivated crops.

RHYPARIDA DISCOPUNCTULATA, Lea. (Order *Coleoptera;* Family *Chrysomelidae.*)

A shining brownish-black hemispherical beetle, about three-sixteenths of an inch in length, with parallel rows of coarse punctures along the wing-cases, and smaller punctures scattered over the pronotum. Eyes black; antennæ reddish-yellow.

Myriads of this excessively common chrysomelid may be seen during spring and early summer resting on the flower stalks of *Chrysopogon aciculatus,* the so-called "grass seed" or "Mackie's Pest."

The beetles are somewhat gregarious in habit, and probably subsist on several different plants.

They usually hide among and injure the young leaves, but do not occur freely on the rosella.

This species, and *Lagris cyanea,* are abundant and widely distributed, and owing to their varied dietary may in the future acquire a liking for economic plants.

EUPROCTIS sp. (Order *Lepidoptera;* Family *Lymantriidae.*)

During March many small caterpillars of this moth were found injuring the young foliage and eating large holes in older leaves.

Being chiefly in one place and at the end of a row adjoining forest land, they may have originated from a batch of eggs that had not been deposited on a rosella bush.

These caterpillars were bred to maturity, but details regarding their metamorphosis need not be given here.

The larva is velvety brownish-black, with dorsal series of dull yellow tubercles tufted with brown hairs and sprinkled with white.

Two scarlet stripes are present on segments 3 to 7, and two shining coral-red osmeteria on 6 and 7. Length about $\frac{5}{8}$ in.

The pupa is enclosed in a light-brown papery cocoon spun between leaves of the food-plant, or on the ground under fallen leaves.

The moth, which measures about $\frac{3}{4}$ in. in expanse, is pale cream colour with a few scattered brown and yellow scales on the wings. Eyes large and black; antennæ bipectinate.

Hind margin of abdominal segments and anal tuft yellow.

PLANT-BUG. (*Dysdercus* sp. Family *Pyrrhocoridae*).

Invariably present on rosella bushes in small numbers.

Description.—Head, prothorax, and basal of hemelytra (wing-covers) white. Anterior margin of prothorax white, bordered behind dorsally by a broad blackish raised band, not reaching outer edges.

Scutellum, apical portion of wing covers, and a large spot on basal half of same, black. Wings smoky-grey.

Beneath.—Reddish-black; hind borders of all body segments white.

Eyes, antennæ, and legs black, with exception of first antennal joint, coxæ, and trochanter, which are red. Beak red to middle coxæ; terminal portion black, reaching hind edge of first abdominal segment.

This is a slender insect about $\frac{5}{8}$ by $\frac{1}{8}$ in. in size.

PLANT-BUG. (*Agonoscelis rutilia,* Fabr. Family *Pentatomidae.*)

Occurs sparingly on rosella bushes. Its usual food-plant is one of our common weeds.

Description.—Black; with brick-red banding arranged as follows:—Above—A cross on pronotum, margins of same and of head, scutellum, and tegmina. Below—Outer borders of body and hind borders of thoracic and abdominal segments.

Size, nearly half an inch long. (10 by 5 mm.)

May, 1919.

THE USEFUL LEMON.

The lemon has many uses in the sick room, the kitchen, and the house. The juice from half a lemon in half a glass of water before breakfast will correct the most torpid liver and prevent bilious troubles. For hoarseness, lemon and sugar will prove helpful and pleasant to take, and will cure sore throat when used as a gargle. In fever, the lemon is cooling and of great value for moistening the lips and cleansing the tongue. Two or three slices of lemon in a cup of strong, hot tea will often cure a nervous headache, and refresh the mind and body. A spoonful of lemon juice in a cup of black coffee frequently will cure bilious headache. An outward application of lemon will allay irritation caused by insect bites. If a teaspoonful of lemon juice is added to boiling rice or sago, the kernels will be whiter and have a more delicate flavour. Tough meat is made less tough by adding a teaspoonful of lemon juice to the water in which it is boiled. Use slices of lemon to garnish fish and game of all descriptions. Lemon juice with olive oil instead of vinegar is preferred by many for salad dressings. After the pulp has been removed, the skins of lemons may be used as receptacles for serving salads or lemon ice. Lemon ice is one of the cheapest, most healthful, and refreshing desserts for summer. Lemonade should be made the national drink, and is greatly improved when the well-beaten white of an egg is added. Iced tea is improved in flavour and made less constipating by the use of lemons. After the juice has been extracted, the rind dipped in salt will clean tarnished brass. Salt and lemon juice will remove rust, ink, or fruit stains from white goods. Lemon juice removes stains of all kinds from the hands, and prevents roughness and chapping. Lemon juice and rosewater, equal parts, will remove tan and whiten and soften the skin. A dash of lemon juice in water makes a cleansing tooth wash, removes tartar, sweetens the breath, and hardens the gums. Dried lemon peels sprinkled over coals will kill disagreeable odours. A cloth soaked in lemon juice and bound around a cut stops severe bleeding until medical aid can be secured.—"Philippine Farmer," Vol. V., No. 2, in the "Tropical Agriculturist."

Botany.

MISCELLANEOUS BOTANICAL NOTES.

By C. T. WHITE, Government Botanist.

(A) NOTES ON A FEW NATIVE PLANTS.

Vigna lanceolata, R.Br.

In this Journal for July, 1918, attention was drawn to the subterranean fruiting of the above plant. In his "Contributions to the Flora of Queensland" (1880), P. A. O'Shanesy had already briefly mentioned this peculiar habit, stating "The yellow-flowered twiner *Vigna lanceolata* produces little nuts, generally of two articles, but much smaller than those of *Arachis hypogaea* or Earth Nut, from the flowers of underground stems."

Solanum torvum, Sw. Devil's Fig.

I find, on examination, that the weed known in Queensland as Devil's Fig, and named as a new species in this Journal under the name *S. largiflorum**, is identical with the very widely distributed tropical *S. torvum*.

Lomatia silaifolia, R. Br.

Since the article on the above plant in this Journal for June, 1919, appeared, in addition to the records referred to on the poisonous nature of the flowers, my attention has been drawn to a note on the subject by J. H. Maiden in the "Agricultural Gazette" of New South Wales for February, 1917 (Vol. XXVIII., p. 130). In this Mr. Maiden quotes several correspondents, who state that numbers of dead flies and mosquitoes were found round vases in which branches of Lomatia flowers had been placed.

(B) RECORDS OF A FEW ALIEN PLANTS.**

Brassica juncea, Hk. & T. Indian Mustard (Order Cruciferæ).

A tall, erect-branching annual, root slender, tapering. Lower leaves petiolate, lyrate, lobes toothed, upper leaves lanceolate. Flowers, at first in short corymbs, afterwards lengthening out into racemes as the pods develop. Pods 2-valved, beaked, including the beak 1½ in. long, beak ¼ in., valves prominently veined. Seeds small, brown, rugose.

Hab. A common weed on farms on Nerang River (known locally as "Chinese Cabbage"), C. T. White; about Brisbane, C. T. White; Yarrabah, near Cairns (a weed in cultivation plots), Rev. N. Michael. This Indian and Chinese plant has been naturalised, or semi-naturalised, in Queensland for some years.

Oxalis cernua, Thunb. Soursob. (Order Geraniaceæ).

Stemless or almost so, rootstock fleshy, producing bulblets and tubers. Leaves, all radical, very long-stalked, of 3 obcordate leaflets. Flowers, yellow, rather large, at first erect, afterwards drooping, 3-16 in the umbel.

This South African species, sometimes cultivated as a garden plant, is not uncommonly seen as a stray. Recently, Mrs. R. Higgins gathered specimens in an old "Staghorn" clump in the bush at Mount Crosby, and Mr. C. F. Wood, Kelvin Grove, near Brisbane, brought in specimens as a common weed in cultivation plots.

In the Southern States it is a troublesome weed, holding much the same position there that *Oxalis corymbosa* does here. It is not, however, at all likely that it will ever prove a great nuisance in Queensland.

Zephyranthes carinata, Herb. (Order Amaryllideæ).

Bulb ovoid, 1 in. diam. Leaves linear, 6 in. to 1 ft. long, 3-4 lines broad. Peduncle, 6-9 in. long. Flowers bright rose-red, 2½ in. to 3 in. long; styles deeply 3-lobed.

This West Indian and Mexican plant is quite naturalised in many places in Southern Queensland; it is quite common in grass land about Brisbane, and I have had specimens from as far North as Yeppoon (Coll. W. T. Bick). It has been suspected of causing losses amongst stock.

Zebrina pendula, Schnizl. (Order Commelynaceæ).

Met with a stray from garden culture on the Blackall Range. It is a native of Mexico and commonly cultivated in gardens, especially in rockeries and bush-houses.

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* *S. largiflorum*, C.T.W., "Queensland Agricultural Journal," Vol. 8, new series, p. 170, pl. 122, and Botany Bulletin XX., Department of Agriculture and Stock, p. 16.

** See also "Queensland Agricultural Journal," Vol. VIII., new series, pp. 269-270; Vol. IX., new series, p. 228.

General Notes.

THE QUEENSLAND WOOLLEN MANUFACTURING COMPANY

In the issue of the ''Queensland Agricultural Journal'' for July last, a manifest error occurred in our remarks on the cotton industry in Queensland, in that the Ipswich Woollen Manufactory is mentioned as having ''closed down.'' The word ''woollen'' was erroneously printed for ''cotton.'' The Ipswich Woollen Manufactory, so far from having closed down, is carrying on an uninterrupted, successful business. We regret that the error was overlooked when the proof sheets were revised.

We have now received the following information regarding the present position of the Queensland Woollen Manufacturing Company from the chairman of directors:—

''The company never closed down, and our sixty-second meeting of shareholders takes place on the 18th August next, when a record balance-sheet (in every way) will be presented to the shareholders.

''The figures speak for themselves, and I will give you the results of last four years' working, and send you a balance-sheet for 1919 when issued at the end of this month. I think it only fair for you to publish same in your August ''Journal.''

MANUFACTURING ACCOUNT.

YEAR 1915.

(From 1st July, 1914, to 30th June, 1915.)

	£	s.	d.
Expenses (including Wages £9,456, and Wool £18,604) ..	30,580	13	10
Sales	46,116	0	7
1915 Dividend—10 per cent.			

YEAR 1916.

	£	s.	d.
Expenses (including Wages £13,424, and Wool £30,103) ..	48,715	1	2
Sales	68,133	17	4
1916 Dividend—20 per cent.			

YEAR 1917.

	£	s.	d.
Expenses (including Wages £12,103, and Wool £31,787) ..			
Sales	51,425	16	7
1917 Dividend—10 per cent.			

YEAR 1918.

	£	s.	d.
Expenses (including Wages £10,527, and Wool £20,366) ..			
Sales	50,144	17	11
1918 Dividend—10 per cent.			

''In the year 1916 the mill was working night and day for some months with three shifts. During the four years nearly the whole of the output was commandeered for the Commonwealth soldiers' material. Our sales for 1919 have reached the record output of £75,680 odd, which, I think, speaks for itself as to the flourishing condition of the company and the benefit to Queensland.

''As your journal goes to almost all parts of Queensland, and many of our shareholders read it, the paragraph will come as a shock to them. The secretary has had already several inquiries as to correctness of the paragraph so far as our mill is concerned, even one from Maryborough.

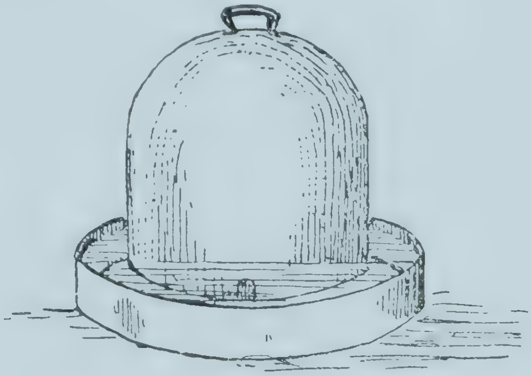
''As to the prospects of other mills, I am a believer that there is room for them, and the day will come when Australia will be exporting all kinds of woollen manufactures. And why should we not do so? We have the raw material and all necessary requirements in the way of coal, water, and man, woman, girl, and boy labour.

''I think you have confused our firm with the Cotton Company, which closed down years ago for the want of the raw material—cotton. I may add that the old cotton mills are now flourishing woollen mills, so that we have two woollen companies in our city, and both flourishing, employing nearly 300 hands.

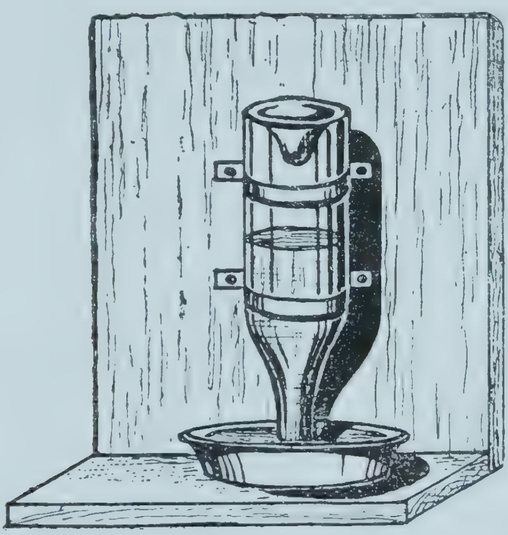
''GEO. R. WILSON,
''Chairman of Directors,
'' Queensland Woollen Company, Ipswich.''

COOL WATER FOR FOWLS.

In a former number of the "Journal" we described and illustrated a drinking-fountain for fowls, by which a constant supply of fresh water is kept up. This consists of a zinc dome with a square hole cut near the bottom edge. This dome is filled with water and set on a zinc trough. The water runs out of the hole at the bottom of the trough, and remains at a depth equal to the height of the hole from the bottom. As the fowls drink, the water continues to run, and so keeps up a supply without overflowing.



A still simpler contrivance is a common beer bottle. Make a stand for it out of two pieces of wood—one horizontal, the other perpendicular. To the perpendicular piece attach two wires to hold the bottle in position. Then put a soup plate in a dish full of water on the horizontal board. Fill the bottle, cork it, then invert it over the dish. Take out the cork, being careful that the mouth of the bottle touches the surface of the water. There will be a supply kept up as long as there is water in the bottle.



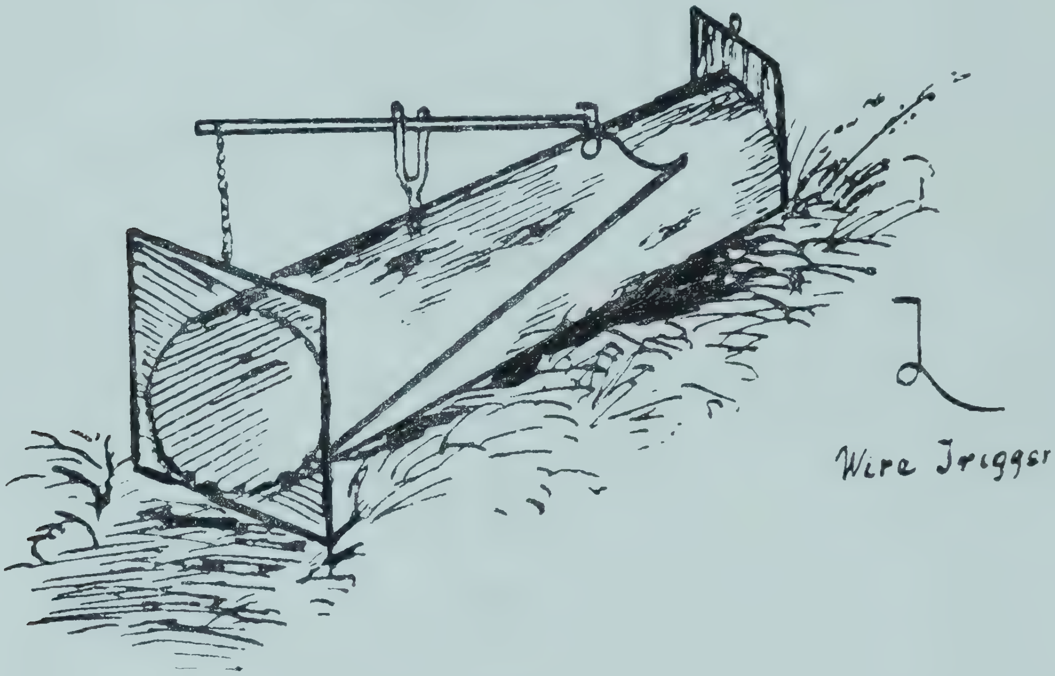
THINNING PEACHES.

Peaches are now coming into fruit, and the question "To thin or not to thin" will arise. It is an undoubted fact that thinning the young fruit greatly improves the quality and size. Now, if a fruitgrower can improve the quality, size, and colour of his fruit, whatever it may be, by thinning it out when young, he realises by future sales far more on the lesser number of superior fruit than he would on the larger quantity of inferior fruit. He has less labour in picking, less to pack, less to cart to market and pay freight on, but he has a larger profit to make than if he allowed nature to have her way with the crop. As to when peaches should be thinned, it should be done when the fruit is the size of a marble. Some say, "Thin when the fruit is as large as the stone will be in the ripe fruit," which is the same thing in other words. In all operations with fruit and fruit trees, note must be taken of the season, whether wet or dry, also of the tree, whether it is in good, healthy, or poor

condition. The former can carry a great deal more fruit than the latter, for the reason that the healthy tree has probably had given to it, or has discovered, some good fertiliser which will help it to bear a heavy crop. It is a good practice to leave a distance of 6 or 7 inches between each fruit.

A BANDICOOT TRAP.

Of the making of traps and "spryngs" there is no end, but, like "bunny" in the West, the bandicoot laughs at all attempts to keep him in subjection. Have any of our readers even tasted roast, boiled, or stewed bandicoot? If not, catch one and try it. The flesh is delicately white and tender, and the flavour somewhat like that of a sucking-pig. For cooking purposes, the animal must be plucked, not skinned. A fair-sized bandicoot will make a good meal for four persons. These animals live entirely on grain and roots and are, consequently, "clean" game. The rabbit is far inferior as food to the bandicoot.



The trap here shown is most effective. It has a false floor, which, on the entrance of the animal, collapses and releases the lever of a trap-door, which then falls and closes the entrance. A second door at the back is then raised, a bag having been previously stretched over the mouth of the log, and the prisoner rushes into the bag, where he meets his fate. All that is wanted to construct the trap is a hollow log about 5 ft. long, having a pipe of 15 in. diameter. A false floor is hinged to the entrance, and a wire catch holds the door lever in position when the door is raised. When the bandicoot runs in to pick up the bait—maize or sweet potatoes—his weight releases the wire catch, the floor falls, and at the same time the door closes on the prisoner. As the trap is left out in all weathers, it should be made of hardwood. The false floor is attached to the wire by a thin piece of string.

SOCIETIES, SHOW DATES, Etc.

Charleville.—Central Warrego Pastoral and Agricultural Association. This Association has decided to hold its Annual Show (postponed from the 27th and 28th May), on 30th September and 1st October next ensuing.

Emerald.—Emerald Pastoral and Agricultural Society. The Annual Show, recently postponed, has been definitely fixed for the 6th and 7th August.

Rockhampton.—Rockhampton Agricultural Society. The show dates have been fixed for the 24th, 25th, and 26th July. The notification only reached us on the 12th July, too late for insertion in the issue of the Journal for that month.

The annual show of the Gympie Agricultural, Mining, and Pastoral Society has, owing to the prevailing epidemic, been postponed to the 12th and 13th November.

THE SOUTH JOHNSTONE CANE PEST DESTRUCTION BOARD.

The Secretary of the Board notifies that at a meeting held on Saturday, 7th June last, Mr. T. Sugden was appointed president, Mr. R. J. Wright, treasurer, and Mr. J. F. Edwards, secretary to the Board.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY, 1919.

Article.		JULY. Prices.
Bacon	lb.	9d. to 11d.
Barley	bush.	5s. 3d.
Bran	ton	£9 5s.
Broom Millet	"	£50 to £70
Broom Millet (Sydney price)	"	£65
Butter (First Grade)	cwt.	177s. 4d.
Chaff, Mixed	ton	£7 5s.
Chaff, Oaten	"	£10 15s. to £11
Chaff, Lucerne	"	£10 to £11 10s.
Chaff, Wheaten	"	£8
Cheese	lb.	11d.
Flour	ton	...
Hams	lb.	1s. 3d. to 1s. 10d.
Hay, Lucerne	ton	£8 to £11
Hay, Oaten	"	£11 10s.
Hay, Wheaten	"	...
Honey	lb.	4½d.
Maize	bush.	6s. 9d. to 7s.
Oats	"	6s. 6d.
Onions	ton	£21 15s.
Peanuts	lb.	4d. to 6d.
Pollard	ton	£10 5s.
Potatoes	"	£16 to £18
Potatoes (Sweet)	sug. bag	6s. to 6s. 6d.
Pumpkins (Cattle)	ton	£2 3s. to £3 10s.
Turnips (Swede)	"	£2 10s. to £3
Turnips, per dozen bunches	...	4d. to 9d.
Eggs	doz.	2s. 2d. to 2s. 6d.
Fowls	per pair	5s. to 8s.
Ducks, English	"	4s. to 5s.
Ducks, Muscovy	"	5s. to 8s. 6d.
Geese	"	5s. to 6s.
Turkeys (Hens)	"	10s. 5d. to 14s.
Turkeys (Gobblers)	"	20s. to 28s. 6d.
Wheat (Milling)	bush.	6s. 6d. to 11s.

VEGETABLES—TURBOT STREET MARKETS.

Beans, per sugar-bag	6s. to 15s.
Beetroot, per dozen bunches	1s. to 1s. 6d.
Cabbages, per dozen	2s. 6d. to 7s.
Carrots, per dozen bunches	1s. 3d. to 2s.
Cauliflowers, dozen	3s. to 25s.
Cauliflowers (small), dozen	3s. to 6s. 6d.
Cucumbers, per dozen	6d. to 2s. 6d.
Lettuce, per dozen	6d. to 1s.
Marrows, per dozen	1s. to 2s. 6d.
Parsnips, per dozen bunches	...
Peas, per sugar-bag	9s. to 16s.
Potatoes (Sweet), per cwt.	6s.
Pumpkins (table), per cwt.	5s. 6d. to 7s. 6d.
Tomatoes, per quarter-case	1s. 6d. to 9s.
Turnips, per dozen bunches	4d. to 9d.
Turnips (Swedes), per sugar-bag	1s. 6d. to 3s.

SOUTHERN FRUIT MARKETS.

Article.	JULY. Prices.
Bananas (Queensland), per case	...
Bananas (Tweed River), per case	21s. to 24s.
Lemons, per bushel-case	11s. to 12s.
Mandarins per case	10s. to 11s.
Oranges (local), per bushel-case	9s.
Oranges (Navel) per bushel case	14s. to 15s.
Passion Fruit (Victorian), per double-case	12s. to 28s.
Pineapples (Queens), per case	9s. to 14s. 6d.
Pineapples (Ripleys), per case	8s. to 12s.
Pineapples (Common), per case	8s. to 12s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per case	10s. to 14s.
Apples, Cooking, per case	11s. to 13s.
Bananas (Cavendish), per dozen	3½d. to 8½d.
Bananas (Sugar), per dozen	3½d. to 8½d.
Cape Gooseberries, per quarter-case	7s. to 10s.
Citrons, per cwt.	10s.
Cocoanuts, per sack	15s. to 25s.
Custard Apples, per quarter-case	4s. to 8s.
Lemons (Lisbon), per half-case	3s. to 5s.
Lemons (Rough), per half-case	3s. to 4s. 6d.
Mandarins, per case	5s. to 17s. 6d.
Oranges (Seville), per cwt.	17s.
Oranges (Navel), per cwt.	10s. to 15s.
Oranges, (other), per cwt.	8s. to 11s.
Papaw Apples, per quarter-case	1s. 9d. to 3s. 6d.
Passion Fruit, per half-bushel case	5s. to 9s.
Pears, per case	11s. to 11s. 6d.
Pineapples (Rough), per dozen	1s. to 2s. 6d.
Pineapples (Smooth), per dozen	5s. 6d. to 6s.
Pineapples (Ripley), per dozen	3s. 6d. to 5s.
Rosellas, per sugar-bag	4s. to 5s. 9d.
Strawberries, per dozen boxes	6s. to 20s.
Tomatoes (prime), per quarter-case	5s. 6d. to 10s. 6d.
Tomatoes (inferior), per quarter-case	2s. 6d. to 3s. 6d.

TOP PRICES, ENOGGERA YARDS, JUNE, 1919.

Animal.	JUNE. Prices.
Bullocks	£20 to £25
Cows	£13 17s. 6d. to £15 12s. 6d
Cows (Single)	£17 12s. 6d.
Merino Wethers	41s.
Crossbred Wethers	50s. 6d.
Merino Ewes	28s. 9d.
Crossbred Ewes	50s. 6d.
Lincoln Ewes	26s. 6d.
Lambs	33s.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5 0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5·0	6·39	5·3	6·30	5·18
3	6·14	5·15	6·31	5 0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5 20
6	6·16	5·13	6 32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6 39	5·5	6·26	5·21
8	6·17	5·11	6 33	5·0	6·39	5·6	6·26	5·22
9	6·17	5·11	6·34	5 0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6 24	5·23
11	6·19	5·9	6 34	4·59	6·39	5·7	6·23	5·23
12	6·19	5·9	6·35	4·59	6·39	5·8	6·23	5 24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6 20	5·8	6·36	4·59	6·38	5·9	6·21	5 25
15	6·21	5·7	6·36	5·0	6·38	5 9	6·20	5·25
16	6·21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6 18	5 26
18	6·23	5·5	6 37	5·0	6·37	5·11	6·17	5·27
19	6 23	5 5	6 37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5 0	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5 0	6·36	5·12	6·15	5·28
22	6·25	5·3	6·38	5·0	6·36	5·13	6 14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6 26	5·2	6·39	5·1	6·34	5 14	6·11	5·30
26	6·27	5·2	6·39	5·1	6·34	5·15	6·10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6·39	5·2	6·33	5·16	6·8	5·32
29	6·28	5·1	6·39	5·2	6·32	5·16	6 7	5·32
30	6·29	5·1	6·39	5·3	6 32	5·17	6·6	5·33
31	6·29	5·0	...	...	6 31	5·17	6·5	5·33

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania.

			H. M.
7 May	☾	First Quarter	9 34 a.m.
15 ,,	○	Full Moon	11 2 a.m.
23 ,,	☽	Last Quarter	8 4 a.m.
29 ,,	●	New Moon	11 12 p.m.

The Moon will be at its farthest distance from the earth on the 14th, and at its nearest on the 29th, when there will be a tota. eclipse of the Sun visible in Africa and S. America, but not in Australia.

5 June	☾	First Quarter	10 22 p.m.
14 ,,	○	Full Moon	2 28 a.m.
21 ,,	☽	Last Quarter	3 33 p.m.
28 ,,	●	New Moon	6 53 a.m.

The Moon will be at its farthest distance from the earth on the 10th, and nearest on the 26th.

5 July	☾	First Quarter	1 17 p.m.
13 ,,	○	Full Moon	4 2 p.m.
20 ,,	☽	Last Quarter	9 3 p.m.
27 ,,	●	New Moon	3 21 p.m.

The Moon will be farthest from the earth on the 8th, and nearest on the 24th.

4 Aug.	☾	First Quarter	6 12 a.m.
12 ,,	○	Full Moon	3 40 a.m.
19 ,,	☽	Last Quarter	1 56 a.m.
26 ,,	●	New Moon	1 37 a.m.

The Moon will be farthest from the earth on the 5th, and nearest on the 18th.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, and July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly prepared ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops as well as much future labour. Attend to earthing up any crop which may require it. There may possibly occur drying winds, dry weather, and even very late frosts, which have not been unknown in parts of this State even as late as September. Still, good showers may be looked for in October, and much useful work may be done during the present month which will go far to afford a fair prospect of a good return for labour. Plant out *Agava rigida,* var. Sisalana (sisal hemp plant), in rows 6 to 8 ft. apart, according to the richness of the soil. Especially should limestone country be selected for the purpose. Sisal will do no good if planted on low-lying wet land, or on a pure sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which (except potash, unobtainable under present war conditions) can be cheaply supplied if wanting in the soil. Sisal requires very little labour from planting to maturity. The price of the fibre now ranges from £40 to £70 per ton for British East African, and the Mexican as low as £28. Sow cotton—Sea Island near the coast, and Uplands generally. Caravonica succeeds best in North Queensland. Sow maize, sorghum, imphee, mazzagua, Indian cane, prairie grass, Rhodes grass, and paspalum, panicum, tobacco, pumpkins, and melons, including the Casseba melon. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger, and canaigre, the latter a tuber yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FLOWER GARDEN.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature. Be careful that the bulbs do not come in contact with fresh manure. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, and coleus, seed or cuttings of the latter. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless, in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, gaillardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulaca, mesembryanthemum, calendula, &c.

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruitgrowers. We can only repeat the advice we have so often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruitgrower, owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this Journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully caried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit-fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

THE TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated, and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

THE SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruitgrowers throughout Queensland during September and the following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables"; and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

QUEENSLAND AGRICULTURAL JOURNAL

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TO OUR READERS.

We have, from time to time, in response to our invitation to "The man on the Land," received some very useful and informative communications, for which space has always been available in the Journal. We shall gladly welcome articles from our readers on subjects connected with rural occupations in their respective districts, especially on those which deal with established industries, and others as yet in the probationary stage. All such articles, addressed to "The Editor," will be carefully considered, but controversial matter cannot be entertained. Articles must be authenticated by the writers' signatures. Anonymous articles will not be accepted.

Agriculture.

A BRIEF HISTORY OF COTTON-GROWING IN QUEENSLAND.

As plants of the cotton family are indigenous to Queensland, the fact may be accepted that this State is adapted for the cultivation of cotton.

About the year 1858, Dr. Lang, who had spent some time in New South Wales, where he made successful attempts at cotton-growing, went to England to advocate emigration to Australia, and to advise emigrants to take up cotton-growing for export to the British market. Whether many British emigrants sailed for New South Wales is not known to-day, but shiploads of people came to Queensland, and amongst them were many of those who had attended Dr. Lang's lectures on cotton-growing. It was he who induced the immigrants by the ship "Fortitude" to take up the cultivation of cotton. They did so, but despite the heavy crops produced on the river flats, the venture did not prove remunerative, until after the outbreak of the Civil War in America in 1861.

Early in the first session of the first Parliament in Queensland, in the "Alienation of Crown Lands Act," provision was made by which a bonus of £10 per bale of good, clean, Sea Island cotton for five years, and of £5 per bale for the following two years, was paid to shippers of cotton to Europe. About this time, the Lancashire spinners were reduced to such straits that they gladly paid high prices for all that could be got in Queensland, and the Lancashire Cotton Company was formed, most

of its members coming to Queensland, where they took up land in the Logan district for the purpose of growing Sea Island cotton. The company brought to Queensland some hand cotton gins, and even with these primitive appliances their operations were, for a time, successful, until at the close of the American Civil War prices of cotton in the British market fell to a point when cotton-production in Queensland proved unprofitable.

During the boom era in Queensland, cotton-growers were greatly assisted, both in East and West Moreton, by the ginning houses established in the former district by Mr. A. J. Boyd, and in the latter, by Messrs. J. and G. Harris, at Harrisville, near Ipswich. The proprietors of these ginneries purchased the raw cotton from the growers at 3d. per lb., and at this price the farmers made a considerable profit. So profitable was the cotton crop, that from Brisbane to Ipswich cotton fields were everywhere in evidence, and, owing to the drought-resisting powers of the cotton plant, these throve and bore heavily when the staple crops of maize and potatoes failed owing to drought.

The industry dwindled until the early eighties, when the Ipswich Cotton Company was formed for the manufacture of cotton goods, and to encourage the company the Government of the day offered a bonus of £5,000 for the first cotton goods manufactured by them. The origin of the company mainly arose through the fact that at that time most of the cotton was grown in the district in which Ipswich is situated—the West Moreton—and therefore, to preserve the industry, the company imported machinery of the latest kind, and succeeded in making the required quantity of cotton goods and claiming the bonus, after which it went into liquidation, the cause of which was not the lack of the raw material. The work was afterwards taken up by Joyce Bros., who were successful in manufacturing meat cover, butter cloth, mosquito nets, and such like goods. At this trade the firm were fairly successful, but with the advent of Federation and the free entry of cotton goods, the company was faced with the competition of goods from countries where labour and all business in connection with the manufacture of cotton are much cheaper than in Queensland. Representation for relief in the shape of a bonus to make up the difference, or for a protective duty, were made by the company to the Commonwealth Government directly, and through the Member of Parliament for the district, but without avail, and the company had perforce to close down.

Thus two periods of cotton-growing passed and failed, through circumstances in which the growers had no part, and these happened within the memory of men then living, who had been active in the first period, and consequently it is no wonder that growers were discouraged and looked askance at cotton as a profitable crop. Had the Commonwealth assisted the company as might reasonably have been expected, cotton manufacture would now have been an established fact, at least in the lines that have been mentioned, if not in additional lines. The drought of 1902 then happened. Farmers were without crops of any kind, and to save the situation the State, through the Department of Agriculture, to encourage the cultivation of cotton, not only for the lint, but as a fodder crop in times of stress, for which it is well adapted, undertook to supply seed, receive the crop, gin, and sell it on owners' account, and meanwhile made an advance when the raw cotton was received into store. No commission was to be charged, the expense of ginning, baling, and marketing being debited against the grower. The advance in 1914 was 1½d. per lb. in store, the lint being sold at 6d. per lb., which gave the growers a net return of 1.65d. per lb. for cotton picked on the farm. Taking the moderate return of 1,250 lb. to the acre, the return is equal to £8 11s. 10d., but gradually the advance grew until in 1918 it was 2d. per lb., and the net return rose to 4d. per lb., or upon a 1,250 lb. crop to the acre at the rate of £20 16s. 8d. to the acre, the lint sold weighing something over 24½ tons.

In the early days a great proportion of the seed cultivated was of the Sea Island cotton, but for the distribution lastmentioned Upland American cotton was obtained, and this forms almost the whole of the lint placed on the market. The Department of Agriculture, in its present campaign, has deprecated a return to the plantation or large-area system, and has strongly urged the cultivation of a few acres on a farm as a subsidiary crop. The reason for this was two-fold. In the first place the labour (Kanaka) that was available in the plantation period is not to be obtained, and secondly a grower with only a few acres can handle such an area with the help at hand without recourse to additional or temporary assistance. Later, if the cultivation of cotton becomes established, the areas would naturally be enlarged in proportion to the profit derived.

About 1903 a Mr. Thomatis, of Cairns, introduced what is understood to be a cross of the Mexican-Peruvian cottons, or, in plain words, an improved Sea Island cotton, which was named Caravonica. This cotton was much advertised, and a

company was formed, principally with foreign capital, to grow the cotton on a large scale, with the help of aborigines. Since the beginning of the war, however, nothing has been done with this cotton, which, being a hybrid, requires careful attention to preserve its qualities, and is not a good cotton for general distribution, and consequently is not used by the Department of Agriculture and Stock for distribution.

Apart from the manufacture of Queensland-grown cotton into cotton goods, there is a demand in Australia for all the cotton that can be grown here for many years. The use to which it is generally put is for strengthening, and at the same time cheapening, the manufacture of woollen goods. In 1916-17, at the middle of the war, Australia imported about 282 tons of raw cotton, principally from China and Hong Kong, and as time goes on the demand for these purposes will increase, but with proper encouragement there seems to be no reason why the manufacture of cotton goods should not be as prominent an industry in Australia as the manufacture of woollen goods.

It must not be forgotten, when considering the cotton question, that, in the most settled districts, there are many still living who have been intimately connected with the three periods of the cotton industry in Queensland.

Attached are figures showing the quantity exported, the export value at shippers' figures, and the acreage for each year since 1866. The production for each year is not given because it would be somewhat misleading, insofar that the crop planted in a year would not be ginned until the next.

Total Exported—13,046,393 lb.

Export Value—£482,783.

Acreage—96,117 acres.

In 1892 and 1893 the exports amounted to 80,783 lb., of an export value of £2,692, from a total area of 908 acres.

There was then an almost total cessation of cotton-growing until the period between 1906 and 1910, when exports amounted to 20,715 lb.; valued at £1,104.

*The quantity of ginned cotton produced from 1914 to 1918 was as follows:—

	Total Seed Cotton.	Lint.
	Lb.	Lb.
1914	9,445 ..	2,794
1915-16	29,230 ..	10,066
1917	118,229 ..	37,694
1918	106,458 ..	54,280

* This was all disposed of locally.

NITRATE OF SODA IN COTTON CULTIVATION.

Experiments over several years have emphasised the great and paying value of this salt in cotton cultivation. The following is the best way to apply the manure:—

The land should be clean. Before sowing, eight or nine good loads of cattle dung should be applied, when the cotton may be sown in the usual manner. In the early spring, the salt should be applied at the rate of one maund (80 lb.) per acre. This quantity is applied at about 5 to 7 inches from the lines of cotton plants, on both sides of the line, and worked in to mix the salt with the soil, and kill off any weeds. The effect of the salt will be noticed in a day or two by a dark-green colour of the leaf. The manure will be of most value in stimulating the growth of plants which have been checked by too much water in the soil.

It should be borne in mind that the most economic use of manure of all kinds is associated with good cultivation of the soil. The better the preparatory tillage, the more marked will be the gain from its use.—"Agricultural Gazette," Nagpur, India.

WINTER CEREAL EXPERIMENTS, 1918.

The Manager of the State Farm, Bungeworgorai, Roma, has forwarded to the Director of Agriculture the following report on the Winter Cereal Experiments conducted during the year 1918:—

"WINTER CEREAL EXPERIMENTS, 1918.

"*Meteorological Conditions.*—The last of the 1917 wheat crop was not harvested until December, operations having been delayed by the unfavourable weather. During January it rained continuously, which prevented all cultural operations from being attempted, but resulted in the subsoil receiving a thorough good soaking, which was the principal factor in bringing about the yields obtained. With February came a change, only 45 points being registered. This continued throughout March and part of April, and for a period extending over seven weeks only 80 points of rain fell. These conditions enabled the preparation of the seed bed to be pushed on with, and by the usual sowing period it had been got ready. In the latter part of April a steady soaking rain was experienced, 262 points being registered, which was most opportune, coming as it did at the recognised time for sowing the main crop. This was followed by a protracted dry spell, May, June, and July together recording only 31 points. In August 165 points were experienced, but the manner in which it was distributed precluded much benefit from being derived.

"No further rain of benefit to the crops was experienced, the next registration being 25 points on 26th October, by which time most of the crops were ready to be harvested.

"*Frost.*—During September, frosts were experienced which wrought more or less damage according to the state of growth and situation.

The following is a tabulated list of the rainfall:—

Month.	Wet Days.	Highest.	Lowest.	Total.
		Points.	Points.	Points.
January	14	250	2	876
February	5	15	2	45
March	1	52	52	52
April	5	220	1	291
May	2	4	1	5
June	1	2	2	2
July	1	24	24	24
August	7	41	1	165
September	—	—	—	—
October	—	—	—	—

"It is evident that the fall of 196 points experienced during the period the crops occupied the ground was not sufficient in itself to be of much value, even if it had fallen in a manner to confer the maximum benefit, which, as will be seen by the above, was not the case, and had it not been that goodly stores of moisture had been conserved in the soil from the rains experienced in the beginning of the year, nothing like the yields which, in some instances reached 24 bushels to the acre, would have been obtained. (See 'Queensland Agricultural Journal,' March—'Wheat Growing Notes.')

"*Manurial Experiments.*—These were not carried out during 1917, and with the exception of Blocks 1 and 2, were bare fallowed.

"The following cultural operations were carried out between the removal of crops in 1916 and sowing in May, 1918:—

"Cultivated in January, 1917, ploughed in March; cultivated in October, ploughed in February, 1918; and cultivated again in March. Harrowing was carried out thrice—just before and immediately after seeding, and once during growth of the crops. It would undoubtedly have been better if the ground had been springtoothed subsequent to the rain experienced in April, as the surface was so consolidated as to prevent the drill entering the ground sufficiently deep to cover the seed in many places. Wherever the grain was so deposited it failed to germinate, resulting in a thin stand and weeds being present.

"The blocks, thirteen in number, of an area of ¼ acre each, were sown with Budge No. 1 during the first week in May, at the rate of ½ bushel to the acre. The plants appeared during the second week in May, and the grain was harvested on 7th October.

"The following are the details in connection therewith:—

No.	Manure.	Cost of Fertiliser per Acre.	Yield per Acre.	Remarks.
		£ s. d.	Bushels.	
1	Shirley's Cereal Manure, No. 1—½ cwt. to acre	0 4 9	17·2	Cropped 1917; soil sandy loam; crop fairly thin; little flag; even height—2 ft. 9 in. to 3 ft.; slight trace of rust; about a quarter of the block, situated at the east end, was very poor.
2	Shirley's Cereal Manure, No. 1—1 cwt. to the acre	0 9 6	19·1	Remarks as applied to Block 1.
3	Shirley's Cereal Manure, No. 1—½ cwt. to acre (top dressing omitted) ..	0 4 9	21·4	This and the subsequent blocks were bare fallowed in 1917, the benefit of which is apparent in the fact that, although only half the manure used in Block 2 was applied, the yield per acre was 2 bushels greater; soil similar to 1 and 2; crop fairly even, 2 ft. 9 in. to 3 ft. high; trace of rust.
4	Unmanured (control)	..	17·6	Soil similar to 1, 2, and 3; crop uneven; thin, short heads; 2 ft. 4 in. to 2 ft. 9 in. high; traces of rust.
5	Superphosphate, 1 cwt. per acre	0 7 0	18·5	Crop fairly even; soil more clayey; grain failed to grow over a portion of the area; very badly infested with sow thistles; height, about 2 ft. 9 in.
6	Thomas's Phosphate (1 cwt.)	0 5 6	18·7†	Fairly even; grain failed to germinate on clayey patches; weedy; height about 2 ft. 9 in.; slight trace of rust; a little more flaggy, due to differences in the soil.
7	Stable Manure, 15½ tons (last application 1916) ½ cwt. Superphosphate	2 5 6 0 3 6	22·1†	As has usually been the case, this block looked well throughout the growing period, being darker and more healthy in appearance than most of the others; germinated fairly well; better than other blocks on the same class of soil; crop fairly even; flaggy; not so rank as in previous seasons; height about 3 ft. over bulk of block; rust in evidence.

No.	Manure.	Cost of Fertiliser per Acre.	Yield per Acre.	Remarks.
		£ s. d.	Bushels.	
8	Superphosphate, 1 cwt. per acre (top dressing not applied)	0 7 0	18·3†	Soil uneven, resulting in uneven crops; grain failed to grow over a portion; weedy; height, from 18 in. to 2 ft. 9 in.; rust in rank patches.
9	Sulphate of Potash, ½ cwt.	0 8 0	14·1	The soil in this block is also very uneven, ranging from a sandy loam to a stiff clay; the growth in consequence of this was very uneven, as was also the grain; a goodly portion failed to germinate, which, in conjunction with destruction wrought by birds, reduced the yield considerably.
	Nitrate of Soda, ½ cwt.	0 6 9		
	Superphosphate, 1 cwt.	0 7 0		
10	Dried Blood, ½ cwt.	0 4 6	15·2†	Remarks as applied to block 9.
	Superphosphate, ½ cwt.	0 3 6		
	Sulphate of Potash, ½ cwt.	0 8 0		
11	Unmanured	..	14·1	This block contains the greatest soil variation within its boundaries, with the result that the crop was very uneven; on the claypan it only reached a height of 14 in., whereas on the loamy soil it was over 3 ft.; germination very poor; rust was noticeable in rank places.
12	Dried Blood, ½ cwt.	0 4 6	16·4	Soil slightly better than in Block 11; crop uneven and weedy; germination poor.
	Thomas's Phosphate, 1 cwt.	0 5 6		
	Sulphate of Potash, ½ cwt.	0 8 0		
13	Dried Blood, ½ cwt.	0 4 6	12·9	Remarks as applied to Block 12; height, 18 in. to 3 ft.; birds destroyed a fair quantity of grain.
	Sulphate of Potash, ½ cwt	0 8 0		
	Superphosphate, 1 cwt.	0 7 0		

† Pre-war prices have been quoted.

COTTON NOTES.

[NOTES IN CONNECTION WITH A DEPUTATION THAT WAITED ON THE MINISTER FOR AGRICULTURE AT THE DEPARTMENT OF AGRICULTURE AND STOCK AT 10 A.M. ON FRIDAY, 7TH SEPTEMBER, 1917, IN CONNECTION WITH THE COTTON INDUSTRY.]

The deputation, which was really a sub-committee of the Brisbane Chamber of Commerce, consisted of Messrs. Bell, Symes, De Little, Pixley, Tunley, and Weatherhill (secretary).

Mr. Bell: We are really a section of the Brisbane Chamber of Commerce and have come to see you on the question of the cultivation of cotton in Queensland. We have given this matter some thought and consideration, and have come to the conclusion that the co-operation or assistance of the Government is necessary for success to be obtained.

Mr. Lennon: It is already receiving assistance from the Government, and the production of cotton has been trebled this year.

Mr. Bell: We want the Government to co-operate and, if possible, extend it still more. We realise it is a very important industry, and think it will be a very valuable adjunct to the crops on the Downs, and even in the sugar districts.

Mr. de Little: I thank you for the courtesy extended in receiving this deputation at such a busy time of the year. As a pastoral and agricultural standing committee of the Chamber, we realise that the Department has done admirable work in promoting the cotton industry by making advances, ginning the cotton, supplying seed free, and the admirable pamphlet by Major Boyd, which gives such information to the grower. The possibilities of the industry seem very good, and we want to assist the Department as much as we can. Perhaps as a commercial body we may be more interested in the secondary industry than the primary, but in any case we are anxious to see the industry go ahead, and the erection of cotton and oil mills gone on with. In 1871 there was over £80,000 worth of cotton shipped to Manchester.

Mr. Lennon: That was under the facilities offered by the bonus.

Mr. de Little: The farmers don't seem to have grasped the importance of the crop yet.

Mr. Lennon: The last two or three months there have been more applications for seed than for years past.

Mr. de Little: I am interested in it at Remilton. One suggestion we were going to make was that the Department might procure and issue a short and concise pamphlet based on the one already in circulation, and with perhaps a little later information. We received information, for instance, the other day from the munitions factory at Mount Morgan, which shows that a man can pick up to 150 lb. of cotton a day. If you could secure a short pamphlet of a few pages, the farmer might read it where he won't read a long one. It might also be assisted by lectures in the principal centres, pointing out that there is always a market for it, that the Government have found a market, and that it is the easiest crop to grow and pick; a very valuable crop which never fails.

Mr. Lennon: One distinguishing advantage is that in drought times it is a good fodder.

Mr. de Little: There was a man in Capella with a few hundred sheep and not a vestige of grass, but he had cotton growing, and fed his sheep on it—the next year he had a good cotton crop and a good wool crop too. It is stated in the pamphlet that a gentleman came from America and was so much taken with the cotton, climate, and soil that he reckoned it was unsurpassed by any cotton belt in the world, and it was his intention to return to Queensland and bring his family with him and go in for cotton-growing. The deterring factor seems the picking. One of the principal reasons for our coming is that the sub-committee have suggested, in order to let the grower be able to pay an attractive wage for pickers, that we approach the Federal Government with regard to a bonus of 1d. per lb.

Mr. Lennon: Have you done that?

Mr. de Little: We were waiting till we saw you.

Mr. Lennon: The matter has been discussed by the Advisory Committee of the Bureau of Science and Industry in the way of offering money for an effective cotton-picker.

Mr. de Little: If a picker could do 150 lb. at 1d. per lb., that would be 12s. 6d. per day. The grower could give 1½d. per lb., seeing that the Government expect to give about 3½d. per lb.

Mr. Lennon: We are selling at 11d. per lb. this year as against 7d. last year.

Mr. de Little: It is hoped by the Chamber that the local consumption will in the near future overtake the production, and then consideration of the erection of mills will come up. Mr. Tunley will know more on that subject than I do. I understand

the machinery from the old Ipswich mills has been removed. With regard to the bonus, we would like to hear your ideas. Some of the sub-committee think the industry should be able to stand on its own bottom. There are such vast possibilities in the industry. The war and the submarine have given the industry protection for some time to come, and this appears to us an opportune time to push this industry for all we can. It was brought up before the Chamber of Agricultural Societies, to get delegates to try and induce farmers to put in a few acres. The season for planting is from now till November, and we want to push it along. The object is to discuss the matter with yourself, the Under Secretary, and Major Boyd (I believe no one in Queensland knows more about cotton-growing than he does), to see if lectures could be given in the various centres and try to get the farmers to put it in now; also with a view to having your opinion as to whether it would be advisable to approach the Commonwealth Government for a bonus.

Mr. Lennon: Before Federation, there was a standing offer of a bonus paid to some firm in Ipswich, but cotton goods under our Australian tariff are almost free, and cotton in Queensland has to compete with American cotton, where there is cheap labour.

Mr. Tunley: I can't add much as to the position. About seven years ago I was responsible for the last attempt to establish cotton-growing. We bought the mill about 1907 (Joyce Bros. Ltd.), and our experience fully bears out what has been said regarding Queensland as a cotton-growing centre. We had expert advice from America. A great obstacle was the ignorance of the farmers—a sort of prejudice that had to be broken down. The fact that some lost a few shares in the Ipswich mill twenty years earlier was a fatal objection. There was a fairly large amount grown, but the only way I could do it was to go round and visit the farms. I would see a man with a kerosene tin. He would put the tin at the end of the row and go along till he got a handful of cotton, then he would walk back and put that in the tin; then he would walk off and repeat the performance, and say the job was not satisfactory. I would then explain that too much time was taken in walking to the receptacle and back, and try to make him see where he could save time and exertion. We put in a little patch of cotton in the mill grounds, and when the mill was idle we would turn the boys and girls in to see what they could do in picking cotton, and we found they could do an average that would represent 24s. a week if they had been picking all the time—that was at ½d. per lb. for picking, the amount usually paid in America at that time. We got an American picker out, and sent him to Capella to harvest a crop there. He was able to pick it at the rate of 300 lb. a day, but that could not be kept up for any length of time, for it was under ''gilt edged'' conditions.

Mr. Lennon: 300 lb. a day?

Mr. Tunley: That was the case with all the bolls ripe. He was picking with both hands, and took the leaves out with his teeth, &c. Wherever the growing was taken up enthusiastically it was a success. In February and March—the dry times—cotton would roll in fast. The farmers with us found that conditions which would kill the other agricultural crops were the best for cotton. Another advantage to Queensland is that cotton grows on perfectly poor soil. Plenty of sunshine and rain and poor soil are an advantage in this way for Central Queensland. In America the frost is sufficiently severe to kill the plants, but in Queensland it is just sufficiently severe to prune them, and practically two crops are the result in Queensland to the one in America. All these conditions quite convinced us of the immense value of the industry to the country. We kept on longer than we would have done for our pocket's sake, for the institution of a good industry. We lost on the manufacture through the freetrade and the cost of importing skilled workers from England, and a good deal over the wages they were getting in Manchester had to be paid, while we had a smaller production because we worked forty-eight hours instead of fifty-four, and had to admit Manchester goods in competition. All of these factors killed us from the manufacturing side.

Mr. Lennon: Did not your firm reduce its operations to the manufacture of cheesecloth, &c.?

Mr. Tunley: We made the stock that we use in our own business, such as the coverings for meat. The sewing-cotton was very good, too, and it was mainly used in our own business. We found the quality of the Queensland cotton very good indeed in comparison with the American. If we had been able to handle a hundred times the amount of cotton we would have been able to make it pay without the assistance of the bonus, but our organising expenses on the amount we had to handle were too much without the assistance. We spent a considerable amount of money each year in doing work we thought your Department could have taken up on its own shoulders —pamphlets on cotton, clerical work *re* the bonus, &c.; and in fact we were a sort of general utility. I also went among the farmers and have spent many months driving round from one farm to another, talking cotton, giving away free seed, &c.

That was a fairly heavy cost. The last full year we had we spent £127 in pure propaganda work, postage on circulars, pamphlets, my going round, &c., but not counting any allowance for my time—merely out-of-pocket expenses in bringing the claims of cotton before the farmers. We threw the mill open on Friday afternoons to the school children of Southern Queensland, and I would give lectures and take them through. Then we offered prizes for an essay on cotton-growing, &c., and children grew small areas of cotton, &c. Our present interest is purely academic as a firm.

Mr. Lennon: I just referred a while ago to the fact that I thought the Commonwealth Bureau were engaged on the question of a cotton-picker—I get copies of the reports of the Committee for the State, and one report of the 19th July of last year is on " Cotton and a Mechanical Cotton-picker." Up to the present I think they have not yet decided that an effective cotton-picker is in existence. We are making inquiries in America, and if we can get an assurance from there, I am prepared to import a machine to give demonstrations throughout the State.

Mr. Symes: You are guaranteeing next year a minimum price for cotton, I think.

Mr. Lennon: We are advancing 2d. per lb.

Mr. Symes: The position that appears to me is that there are enormous possibilities in cotton-growing. Our farmers, if they are going to specially cultivate, must have some guarantee ahead of this year.

Mr. Lennon: How are we going to make it a permanent thing? We can only guarantee a market if the Commonwealth help it.

Mr. Symes: If you can guarantee it for three years, say, that would be doing a great thing for the State, and you would be giving them almost a State bonus.

Mr. Lennon: It would be a bonus if it resulted in any loss.

Mr. Symes: I think it would be a great test so far as the industry is concerned, and that the State should stand the expense.

Mr. Lennon: I am inclined to agree with you.

Mr. Symes: It would be a great thing for the Department if they could prove that cotton could be grown successfully. We could then go to the Commonwealth and say, " This is a great industry; you must protect us." If you could say that you could protect the cotton-grower for three years, and a pamphlet could be immediately sent out through your Department to the farmers in the cotton-growing areas in Queensland—a simple pamphlet, pointing out that he will be protected for three years, and giving information in regard to planting, &c., that he would easily understand—I am quite satisfied that there would be an immense response. It is no good telling the farmers to plant vast areas of cotton and then have no market.

Mr. Lennon: I think your suggestion is a very good one, but I would not send the pamphlet to the cane farmers at Cairns. They won't even grow corn for their horses, or vegetables. We would exercise our own discretion by sending the pamphlets where they would be of some use.

Mr. Symes: If you would do that we could probably assist you.

Mr. Lennon: I am glad to see the Chamber of Commerce taking a live interest in the matter. We have been doing what we could, but are not too conceited to receive advice from such a body as yours. You have correspondence through your Chamber that would facilitate our efforts, to a great extent.

Mr. Pixley: I entirely agree with the necessity for propaganda work. This pamphlet of Major Boyd's is an admirable pamphlet, but far too technical for the ordinary farmer to read through.

Mr. Lennon: You remember, Mr. Pixley, when Mr. Girault was brought here to deal with the cane grub in the North, he wrote a pamphlet that would only be of use for scientific societies, but he finally prepared a more reasonable one. I quite appreciate the difficulty you refer to.

Mr. Bell: If you could get the assistance of Mr. Watson, the Advertising Agent, it would be a great thing.

Mr. Lennon: I will get Mr. Scriven in.

Mr. Bell: If the industry were established and were successful during the war, how would we get on after it?

Mr. Tunley: That was the condition after the American Civil War.

Mr. Scriven: I think the question of a three years guarantee requires some thought, especially with regard to the matter of a market after the war.

Mr. Symes: If you are going to form a new industry, the State must pay for the advertising. If after three years it can be shown that cotton can be grown profitably we can go to the Commonwealth and say, " We have proved it, you must support us."

Mr. Scriven: You can.

Mr. Lennon: It is the duty of this Department to help in every possible way to start industries.

Mr. de Little: The Department has done good work so far.

Mr. Lennon: The items we have been making the inquiries about are—cotton-picker, linter, and oil-crushing machinery, &c.

Mr. Scriven: You can freely say you will give an advance of 2d. per lb. for the next three years. It has never been below 2½d. at the final balancing-up.

Mr. Lennon: We will give that guarantee for three years of an advance of 2d. per lb. on the cotton sent in. We give back the whole return to the grower, less the actual cost of labour. There is no charge for the use of the ginning machine.

Mr. Tunley: There is a large amount of cotton imported by Victorian firms.

Mr. Lennon: I don't want machines here that are not effective and that will make me a laughing stock. We only want good ones.

Mr. de Little: Is there not a local invention—a vacuum picker?

Mr. Scriven: To get a machine to take bolls of all sizes is "the rock they are splitting on." They can get them to pick bolls of one particular size.

Mr. de Little: I think it is something on the principle of the vacuum cleaner.

Mr. Scriven: Yes, but it will take a large boll but not a small one.

Mr. Lennon: The nearest approach has been on the lines of a traction engine, and stands right over the bush. It has been pointed out, Mr. Scriven, that Mr. Boyd's pamphlet is very instructive, and gives satisfaction to a number of people, but it is suggested that a similar amount of information, much shortened, might be published in Queensland. Mr. Pixley points out that it wants to be in simpler language, and shorter.

Mr. de Little: It contains separate articles on "When to sow," "How to pick," "How to cultivate," "Choice of soils," &c., and has a good index.

Mr. Lennon: All things going well, Mr. Scriven, don't you think, in proportion to the seed being distributed, that this will be double last year's crop?

Mr. Scriven: Quite.

Mr. Lennon: This year's crop was treble the last one.

Mr. Pixley: How about the area?

Mr. Lennon: That would be hard to tell. As far as planting is concerned I should think 2 or 3 acres would be enough.

Mr. de Little: It is hardly worth putting in less than 5 acres. I have a man on the share system, and he is picking and looking after 5 acres himself.

Mr. Scriven: It is very up-hill work establishing cotton here now. The industry has had four setbacks in the lifetime of people on the land now. The first time was the plantation system which came to grief after the conclusion of the American Civil War. Before then we grew almost as much cotton as wool. Then the Ipswich Cotton Company started, and the industry was going well, but it came to grief. Then Joyce Bros. started, and they were paying expenses and the Federal Government refused to give them any help, and they could not compete against the imported article and down it went again. All this has happened within the knowledge of the present agricultural population, and it is difficult to get the people to think it is going to be successful.

Mr. de Little: The submarines have given them protection, and no manufactured cotton articles will be coming in till after the war. You are quite able to offer 2d. per lb.

Mr. Lennon: Yes, that is decided. I think the Commonwealth Government has been approached to offer a bonus for the invention of a picker.

Mr. Scriven: I think it has been submitted. The Council here have a committee, of which Mr. Norman Bell is one, to try and get a picker. The trouble is to get a picker to tackle all sizes. That is the cause of failure of the American pickers, so far as we can learn.

Mr. de Little: Mr. D. Jones is inventing a machine to pick 200 lb., and men at Mount Morgan have done 150 lb., so there won't be much advantage.

Mr. Lennon: I was present at a demonstration and the work was fairly satisfactory.

Mr. de Little: I think the present difficulty is the picking of the cotton. The men who have not tried it and not picked it are told they can't run it without black labour.

Mr. Lennon: Mr. Scriven has practically said the same as I have done, and you will see it has not been unconsidered by the Department. We think we are going on fairly well. We are glad to see the Chamber of Commerce taking an interest and

think if information can be disseminated as broadly as possible it may help it on. I will give consideration to the matter of enlarging the scope of the dissemination of the pamphlet.

Mr. Symes: I think if we could give you an idea of what we thought practical you could cross out, or do to it anything you thought good.

Mr. Lennon: I would be glad to get information from you and we will endeavour to accelerate our speed.

Mr. Bell: You have about 3,600 farmers getting the "Journal," and I expect a lot don't know the "Journal" is in existence. Perhaps a few copies would enlarge the circulation.

Mr. Lennon: If we sent it to the various Chambers of Commerce in the State, they could perhaps send it out.

Mr. Bell: There are Farmers' Unions in the various centres.

Mr. Pixley: There is the Returned Soldiers' Association, &c.

Mr. Lennon: We will hardly send it to political bodies and ask them to distribute it.

Mr. Bell: Is there anything else that occurs to you?

Mr. Lennon: We will be pleased to have anything you can recommend. Example is stronger than precept. I think that most of the members of the agricultural societies get the "Journal."

The deputation then thanked the Minister for receiving them, and they were taken down to see the cotton gin at work.

The increase in the area under cotton during the last four years has undoubtedly been mainly due to the sympathetic interest in the industry manifested by the Minister for Agriculture. It will be interesting to our readers to recall the proceedings of a deputation of business men, who waited upon him in September, 1917, nearly two years ago, and to note what has since then been done by the Department of Agriculture to encourage farmers to grow cotton, if only as a subsidiary crop. We publish in this issue of the "Journal" a brief résumé of the progress of cotton-growing in Queensland.

THE FUTURE OF RAW COTTON.

The "Daily Mail," Brisbane, publishes a letter to a Brisbane firm, under date 7th July, from Messrs. Harrisons and Crosfield, Ltd., Kobe, Japan, dealing with the cotton yarn trade, and with the future of the supply of raw cotton. The firm wrote:—

"During last month we received from Australian branches several inquiries for quotations on cotton goods. In most cases no business resulted, a fact which did not surprise us, and we will endeavour to put before you the various causes that keep the price of cotton goods so high. First, it must be appreciated that the stoppage of orders from Australia did not affect the Japanese cotton market, as was probably expected by you, Japan having larger buyers in other parts of the world, who continued to place orders.

"Now, take the supply of raw cotton. Advices from America state that this year's crop is 10 to 15 per cent. short of last year, much space, previously given to the growing of cotton, having been taken up to supply foodstuffs. We are now advised from the same quarter that excessive rains have caused a further decrease, and reports from other cotton-growing countries all tell of a shortage.

"Since the beginning of this year, countries where attention for the past four years has been taken up by the war, are now turning to commerce and calling for supplies of raw cotton, hence we find that the demand far exceeds the supply. Holders of cotton yarns in Japan are finding it more profitable to stop weaving and sell their stocks of yarn. Naturally, owing to the shortage, we find much speculation going on in cotton circles. Spinning companies are making huge profits at the expense of the manufacturers, who find the position very serious, inasmuch that they are unable to offer prices that will induce business, and many finding themselves unable to carry on are forced to close their factories. The Toyo Spinning Mill held a meeting in Osaka on 20th May, and the directors recommended to the shareholders a 60 per cent. dividend for the term just closed. The Kanagafuchis have just finished their year with a 70 per cent. dividend. These are fair illustrations of the profits being made.

"Owing to the upward tendency of the New York Cotton Exchange, the market here has been rising gradually, and it is only the inactivity of foreign buyers and the cautious attitude of the weavers that keep it from abnormal rises.

"A few figures for comparison will best illustrate the position this year. The highest price recorded in 1918 was during October, when Yen 443 per bale of 400 lb. for yarns of 20 counts was reached. In November this dropped to Yen 360, and in February this year we see prices at Yen 400. On 24th May the quotation advanced to Yen 465, and on 7th June to Yen 480. (One Yen=4s.)

"Forward deliveries have reached a record price, the present quotations for November delivery being in the neighbourhood of Yen 450. It is anticipated here that when stocks in Australia become reduced, buyers will again have to turn to Japan for supplies until conditions in other countries become more settled. If the present position does not improve they will have to pay higher prices for their goods than ever before.

"Taking the general position of supply and demand as a guide, it does not seem reasonable to expect any appreciable drop on this market for some time to come."

THE VALUE OF SHEEP ON THE FARM.

Sheep are valuable on all farms, except those which are low and marshy and, in consequence, subject to disease. Even on these the Romney Marsh breed—which is, unfortunately, not too well understood in this country—will even thrive. Sheep are valuable for many reasons. In the first place, they do not require as much capital to start with as is the case with other classes of live stock. Secondly, they do not require any shed accommodation, and, thirdly, the problem of high-priced and incompetent labour, which is becoming more serious every year, does not need to be considered much in the keeping of sheep. Very little capital is required to start a flock of about 200 ewes. If properly fed and cared for during the winter months, and properly looked after during lambing time, 200 ewes should raise at least 150 lambs. These lambs should be worth at least 10s. a head, and at the end of the first year, with lambs and wool, the owners should have a net income of £100 to £150, and still have his 200 ewes left. Within the past couple of years there has been quite a tendency on the part of dairymen to go out of cows, and concern themselves with sheep, their reason being that they have become disgusted with dairying on account of the scarce, high-priced, and incompetent labour available. In the keeping of sheep the labour question is in a large measure abolished, seeing that they require a very small amount of labour during the greater part of the year. Give the sheep enough grass to eat and all the fresh water that they can drink, put a little salt before them and visit them at least once a day whilst the blowflies are about, and they will look after themselves and make money for you. Of course, there is a time in the year when all the sheep require very close attention. In order to be successful and to raise the largest percentage of lambs the mother ewes must be well looked after. The presence of a shepherd will save the lives of many lambs, and occasionally a lambing ewe. The wages bill in connection with the keeping of sheep is a small item in comparison with what is necessary for other classes of stock. One man can take care of a good-sized flock of sheep, and still not have to be out of bed at 4 o'clock in the morning, as is the case where the milking of cows is concerned.

AS WEED DESTROYERS.

Sheep are valuable as weed-destroyers and in helping to free the land from useless vegetation which nearly always crops up after cultivation. As weed-destroyers sheep have no equal. They are very fond of weeds, and many times they will leave good grass and pick out the weeds. Another important consideration as to the value of sheep on the farm is the undisputed fact that they improve the land on which they graze. It has never been found, though any amount of experiments have been made, that sheep decrease the fertility of the land; but, on the other hand, always improve it. During the last few years South Australian farmers have been forced to realise that they cannot take crops year after year from the soil without giving back to the soil the necessary fertility to enable it to keep up its productiveness. Where this important matter is not realised, an exhausted condition of the soil will soon be evident. No other farm animal is better adapted to keep up a farm in fertility than is the sheep. Manure from sheep is far better and richer than that from other animals, a fact which has been determined time out of number by chemical analysis. Sheep will spread their manure over the land on which they feed more easily than any other stock, and generally leave most of it in places where it is needed, for it is the sheep's habit to select the highest points for a camping ground, and consequently to leave the droppings on bare rises and hills, where they do most good. The day

has long since passed for farmers to regard sheep with dread, as was the case years ago, when a farmer in the Middle North made experiments with a flock, and as they dropped off one by one felt quite a feeling of relief when the last one was dead. He was then heard to explain, in quite a thankful spirit, that they couldn't trouble him any more. During the past ten years it is a fact that every intelligent farmer who has accumulated wealth will frankly state that, without exception, so far as livestock are concerned, he received his best and easiest money from his flock of sheep. It is hardly necessary to say that the class of farmer who makes money out of his sheep is not of the type which allows several of them to be eaten up alive by maggots, and then wonders what on earth has killed them.

Sheep-husbandry is a profitable line of work in any ordinary season wherever farming operations are justified. A man who does not like sheep should never engage in sheep-husbandry, for he will not give the sheep due care, and for this reason the sheep, on their part, cannot give him more than small returns. The men who really love sheep are those who have success with them and reap the largest profits from them. Sheep are easily handled, and more economical gains can be made from the feed consumed by them than from any other farm animal. All farmers who have any liking for sheep should begin in a small way, and if they will give the sheep a fair chance they will soon learn that they are good and easy money-makers on the farm. No breed of sheep will do well under rough treatment, and quick-tempered, harsh (not to say brutal) men are diametrically opposed to the peaceful nature of the sheep. Perhaps no other animal on the farm appreciates and responds to kind treatment more readily than does the sheep. It is quite extraordinary how soon a man who really understands sheep will make a pet of one and generally quieten it until it will do almost anything indicated as a pilot or decoy for working about yards and sheds—"*Garden and Field.*"

PREPARING THE LAND FOR A FLAX CROP.

The popular idea is that flax is a hard crop on the land and, therefore, that it exhausts the fertility of the soil. A study of the root growth of the plant will throw some light on this question. Wheat, oats, or any of the grasses develop a mass of fine, fibrous roots near the surface of the ground, and these all act as feeders of the plant. The flax plant, on the contrary, sends down to the subsoil a single long taproot with very few fibres on it, and, instead of stooling out, as do our grains and grasses, it sends up one straight stem which branches out only when it has attained a considerable height. It is thus apparent that for a flax plant to do well it must have a large amount of prepared plant food at hand to supply its limited root development. This is also borne out by the fact that the crop only takes from 70 to 100 days from seeding to mature, the average being about 90 days.

The heaviest draft in flax culture is made upon the nitrogen of the soil, and this fact, taken in connection with the further fact that nitrogen is more abundant in virgin soils than in those which have been cultivated, explains the greater success of flax culture on new land. Flax has, therefore, come to be looked upon as a new-land crop in the United States, when it does better than any other crop, returning from 10 to 20 bushels of seed and about 1,800 lb. of straw.

There are several ways of preparing such land for a flax crop. Many successful growers in America break up the grass land about 2 inches deep, then cut the sod fine with a disc harrow, and sow, rolling immediately after sowing, so as to leave the ground smooth for harvesting, as the small pieces of sod catching on the guards of the binder cause endless trouble. A greater number of growers prefer to break 3 to 4 inches deep, but their subsequent treatment differs. Some roll immediately after ploughing, and then sow with a sharp shoe-drill. Flax, however, is a crop that likes a good seed bed, and experience shows that extra cultivation will, as a rule, give better returns.

The use of the roller is essential in attaining the best results. If some cultivation is done and fine soil so worked into the sides of the furrow slice, and all pressed down firmly with the roller, the moisture cannot escape unless through the sod. The fine earth acts as a mulch, holding the moisture, thus presenting the best conditions for rotting the sod, which will furnish food for the growing flax crop and not be in the way of another crop in the following spring. A crop of oats following a flax crop is generally found to do well. The quantity of seed to sow is from 28 to 42 lb. per acre. If moisture is sufficient, the shallower the seed is sown the better. Half an inch will do in that case, but the safest way is to sow it from 1 to 2 inches deep. Flax may be sown broadcast, but the drill is generally used.

MORE ABOUT FLAX-GROWING.

We have received from the Department of Agriculture, Nairobi, British East Africa, a very interesting and informative pamphlet, by Mr. Hugh Simpson, Flax Instructor, entitled "Flax as a Fibre Plant," with "Hints on Flax Cultivation and Flax Culture," from which we take the following notes. These will doubtless afford much of the information we have been asked for of late on the subject:—

Flax is partial to no particular climate or country, having been grown in the porthern parts of Russia, and now in Tropical East Africa; also, from the remotest ages, in most other countries of which we have any history. We read of it in the Sacred Volume as raised in connection with barley in the days of the Israelites in the land of Egypt, and by them made into fine linen fabrics.

The wonderful strength and durability of the mummy linens found to-day in the tombs of Egypt, and which must have been made 4,000 years ago, is striking proof of the outstanding qualities of the fibre. War, the great prover, has placed the superiority of linen in an unassailable position. In fabrics for military requirements requiring the greatest strength and durability, this fibre, after exhaustive experiments, was found to be the one satisfactory covering for the wings of aeroplanes. To-day the Allies depend greatly on the North of Ireland for producing flax for aero cloth essentials and surgical dressings.

In pre-war days Russia was the largest supplier of Britain's demand, but with a very ordinary flax. Belgium, from the banks of the Lys, supplied much less, but of a much superior quality. Both of these countries are out of count at present. The demand is greater than the supply, and is likely to be for some time.

B.E.A. can and does supply a flax much superior to the Russian article; and, while it may not be so good as the Belgian article, it is of a quality comparing well with Irish flax, and it is the quality which is in greatest demand.

SOIL AND CULTIVATION.

Flax will grow on nearly every kind of soil with attention and good culture, but some soils are better adapted to it than others.

To produce the best returns, the soil should be brought to a fine state of tilth. Flax likes a deep, fertile, and mellow loam, and on such soils a heavy crop of both fibre and seed may be produced. But, as we approach the water-logged soils—or the very light murrum soils—our chances of success become less, and, on the latter, flax culture should never be attempted. These limits embrace a wide range and great variety of soils, all capable of producing, under proper treatment, superior crops of flax.

To produce the best returns, a system of rotation should be adopted and the soil well cultivated and ploughed to a depth of 8 in. or 9 in. in the autumn, and in the spring ploughed to a depth of 4 in. or 5 in. The finer the soil is made, the better the crop, the more even the growth, and the finer the fibre produced.

ROTATION OF FLAX.

The place in the rotation which I consider most suitable for the flax crop in this Protectorate is on wheat stubble which has been grown after some previously manured crop or after a crop of maize.

By so doing the manure has sufficient time to be decomposed and its elements made available as food for the flax plants. The manure becomes thoroughly blended in the soil by the repeated ploughings and harrowings it receives. In this way a much more even, better yielding finer quality of flax is produced than is possible under other circumstances.

Very good successive crops of flax are grown in this Protectorate; but the result is not so certain and never so satisfactory—the crop being less uniform in length, coarser in quality, and rather more wasteful in cleaning. To a casual observer the crop may appear very good; but a man of experience will look to the great waste that is certain to ensue in the mill, for, as the scutcher holds the "strick" of flax nearer one end than the middle, a great deal of the shorter flax escapes his grasp and finds its place amongst the tow.

Keeping the foregoing observations in view, it is of little consequence what the other crops in the rotation may be; but, as the flax plant delights in change of soil, I would not recommend it to be grown oftener than once in a three-course rotation on the best soils.

As to situation, the only places we have to guard against are high altitudes, bare exposed situations, and the shade of trees. In the latter case, the crop is apt to lodge and lie down and become rusty before it has put on fibre.

SELECTION OF SEED.

The selection of seed for sowing, like everything else in connection with flax management, requires considerable care and attention. A good many farmers appear to think that flax seed is all of one quality so far as its productiveness is concerned. There is just as much difference in the productive quality of flax seeds as there is in maize; and a large proportion of that flax seed which is sold is no more fit for seed and no more productive than maize would be, were all the half-ripe ears shelled and planted with the good ones for seed. No intelligent farmer would ever think of planting such corn; although it might germinate, it would not and could not produce a good crop of grain. So half-matured flax seed cannot produce a good crop of either fibre or seed. But unless farmers raise their own seed in the following way, they will be obliged to take up such as they can purchase, whether it be of good quality or not. My practice has been to obtain the plumpest and brightest seed to be found, then run it through the winnowing machine a few times, and blow out all the light seeds with a heavy blast.

At harvest time select those stooks of flax that grow best and ripen first, and keep them separate from the rest, and save the seed from them for sowing the following season. Continue this practice for a few years with good cultivation, and both the quality and quantity of the seed will be greatly improved and the length and excellence of the fibre very much increased.

Every intelligent farmer will readily perceive the importance of growing his own flax seed when it can be done with so little trouble and expense.

SOWING OF SEED.

The proper time for sowing differs considerably in this country, according to rainfall, soil, situation, and elevation above sea-level. A certain season of the year that would be considered early in one part might be very late 100 miles in either direction; therefore the fixing of a definite time for any locality is a matter for the farmer's discretion.

I would suggest sowing when the bulk of the heavy rains is past, as soon as the dryness of the land and a fine settled state of the weather will admit. Sowing should never take place during rains or when the soil is so wet that it will adhere to any implement.

The proper quantity of seed, if selected according to the foregoing remarks, would be from 70 lb. to 80 lb. to the acre, as some soils require more seed than others. It is safer, however, to sow on the thin side than on the thick, as the latter is very easily laid down by the rain and does not mature fully.

I may state that a little more Riga seed should be sown than Dutch, as the former is rather larger than the latter.

Having ascertained the quantity of seed necessary for the extent of the land to be sown, the ground should be marked out in plots 12 ft. wide, and the total number of pounds of seed divided by the number of plots, so as to ascertain the number of pounds of seed for each plot. The sower, who should be a very careful person and accustomed to sow grain well, should take the number of pounds for the plot into his sowing sheet and proceed to sow, going with a steady measured step, taking small handfalls and throwing pretty high and strong, letting each cast slightly overlap the other, and taking care that too much does not escape from him in the backward swing of the hand. So proceed with plot after plot, giving each its proper number of pounds of seed, until all is finished.

After sowing, the seed should be harrowed in with a very fine light harrow; if the soil be lumpy, it would be advisable to roll the first harrowing, and, after rolling, give a "tine" of the harrow crosswise or in the different direction. By so doing, the flax plants will all have a chance of braiding together. If the soil be light, leave it presenting the rolled surface; but, if heavy, it is better to break the surface again with the light harrow.

WEEDING.

If cultivation has been properly executed previous to sowing the seed, the weeding of the crop will neither be very troublesome nor expensive, and, if the land has been undergoing a course of tillage during the previous crops, it often happens that the operation can be dispensed with altogether; but, should weeds—such as wild mustard, clive, &c.—unfortunately make their appearance, as is often the case, they must be got rid of while the flax is young or before it exceeds 9 in. high.

This work will be best performed by children, as they will be light on the tender young flax. Care ought to be taken that the weeders work facing the wind, so that the breeze may assist the down-trodden stems to regain their position. Moist

weather should be chosen for the operation of weeding in preference to dry, as it is easier for Nature then to repair any damage that may have been done through the bruising of the plants or the exposure of their roots.

If new dams or steeps have to be made, this should be done as soon as the weeding is finished. This allows of them being filled with water and their banks well saturated with water for some time before the flax is ready for retting.

PULLING.

The proper time for pulling is a very fine point to determine, and one upon which even experienced flax-growers do not quite agree, some advocating early pulling on account of the superior fineness of the quality gained thereby, whilst others say that by letting it become rather on the ripe side the increase of weight of fibre more than compensates for the want of quality.

I believe both are correct to a certain extent; and perhaps it is necessary for the development of the various shades and the degrees of fineness in our linen fabrics that this difference of opinion should exist. There is no doubt but that the extraordinary fineness of quality of some samples of flax produced in the old country, and worth as much as from £200 to £300 (sterling) per ton, is chiefly obtained by pulling the crop on the green side. But it is equally certain that this result is obtained by retting the green flax with the seed not taken off, as the oil adds to the lustre and soft appearance. Experience shows that the medium between the rather green and the rather ripe state is that which produces the greatest possible amount of fibre compatible with a marketable quality, and therefore the most profitable state at which to pull.

The medium point is determined first by observing that the seed-bolls begin to turn from green to a light-brown colour, and, secondly, by examination of the stem, the leaves of which should have become yellow for two-thirds of its length from the ground and the lower half divested of its leaves or have them withered and dried up. The examination of the stalk is more to be depended upon in this country than the colouring of the seed bolls, as they do not ripen evenly together; whilst, in some very dry seasons, they turn brown before the stem presents these appearances. The field, however, when viewed, should have begun to assume a uniform yellowish tinge. A combination of all these appearances will indicate the proper period.

About eight or ten boys will pull an acre of flax in a day. They should gather with the right hand, catching it near the middle, and with a firm grasp, not gathering too much at each pull, so as to be able to keep it perfectly even at the root ends.

Great attention should be paid to this keeping of the roots even in its passage through this and every subsequent process, as its evenness in the roots greatly enhances its value to the spinner.

Dry weather is greatly preferred both as affording better facility for drying the bolls and less time is required to get the green straw out of the effects of the sun. The sun is very injurious to flax both before and after retting.

In drying the straw for seed it should be turned each day, so that it gets the sun evenly. Should there be some parts of the crop long and some short, it should be kept separate through this and every operation for reasons before mentioned.

THRESHING OF SEED.

This operation should take place immediately or as soon as possible after the crop has been gathered into stacks or barns, so as to allow of the retting process being carried out.

In removing the seed care must be taken not to injure the stems.

There are, at present, different methods of removing the seed; one is by the use of a rippling comb—a very simple implement with teeth 6 in. long and three-sixteenths of an inch apart. This comb can be screwed on to a plank and the operators work at each side of it. Another system is by the use of wooden hammers.

The most up-to-date method is by the power-driven roller thresher. Six to eight boys are required to work it—one at each end to feed the rollers, and one to hand the "beets" forward to the feeder, and one or two boys to shake the straw and rebind it again. The feeders stand at the end of the rollers, taking hold of the butts of the bundles, and pulling the heads of the bundles through between the rollers; care being taken not to put them in any further than is necessary to mash all the bolls. Passing through a few times will be sufficient to break all the seed-bolls.

This machine, if properly attended to, will thresh from 10 to 15 tons of straw per day.

WATERING OR RETTING OF FLAX.

This is a process by which the vegetable matter connecting the stem and fibre is decomposed by fermentation under water, and this process is the most important that the flax, while in the farmer's hands, has to pass through; for no matter how suitable the soil, or how well it has been cultivated, or what amount of care and skill may have been bestowed on the operation of sowing, pulling, &c., the value of the fibre depends very much on the successful handling of the flax at this stage.

There are, at present, two systems of retting flax in this Protectorate; one is dew or grass retting; the other—the only true way—is water retting.

Dew-retting I do not recommend for this country. In the first place we have not got the fine grass pasture on which to spread out our flax, and, no matter what the dew at night may be, or how hot the weather, the powerful effects of the sun's rays on the straw weakens and burns it up and, when scutching time comes, it is of a weak, dry and harsh nature. It is not evenly retted and is ''stripped'' and not all of one shade, while it has got that dull leaden colour which is troublesome to bleach.

Water-retting.—The system of water-retting calls for close attention on the part of new and inexperienced flax growers. There are certain methods and rules and indications which practice and experience have proved necessary to bring the crop safely, and in the most profitable fashion, through the process.

The ''dams,'' as I have remarked elsewhere, should be made some time previous and where an unfailing supply of water can be depended upon in the driest season. They are generally made from three and a-half to four feet deep and about twelve feet wide and thirty to forty feet long—according to the quantity of flax straw that can be dealt with in a day. The sides should be cut with a slight slope so as to guard against their falling in when moistened with water. Any farmer who is setting out to grow flax on a large scale will do well to provide himself with at least six or eight of these retting tanks. The choice of position of the dam is fixed by the water supply available, and a shaded, warm situation selected, say, to the lee of a wood in preference to a cold, windy or exposed position. The soil should be of a clayey nature so as to prevent leakage, and the consequent adding of fresh water to supply this loss. Soft water is best for retting flax. River water, or that which has run a considerable distance exposed to the sun and air, should always be preferred; while water impregnated with lime, iron or other mineral substances, is liable to discolour the flax more or less. Soft water is quicker and more certain in its action.

Some farmers think that, to be successful, they must produce flax of a white colour. This is a mistake, as flax of a nice dark shade or silvery ''blae'' is quite as marketable, if not more so, than the white shade, and it often occurs that the ''blae'' flax is found to possess more weight, and the fibre of soft silky quality to a larger extent, than the white shade.

In the case of river water it need not be let into the dam until after the flax is placed in. But when spring water has to be used, the dam should be filled with it for a few weeks previous so that it may become softened and warmed by exposure to the sun and air.

Having got all ready for filling the dams with flax, one man stands in the dam and another person hands the butts of flax to the man in the dam, who commences at one side and places a row across it, putting the top ends down and the root ends up, inclined to an angle of seventy-five degrees or more according to the depth of the dam, proceeding thus till the dam is full and taking care not to pack the flax too tight, as this hinders uniform retting. Another advantage gained by steeping with the top end of the flax down is that, should there be any seed bolls left on the flax, these come off when down in the bottom, and the oil extracted therefrom has to find its way to the surface of the water, thus adding to the soft appearance of the flax. When the flax is in the steep it should be covered all over evenly to the depth of two or three inches with water. Some people keep down the flax with wattle or other poles, but I should prefer to use flat stones, being more convenient and inexpensive. When once collected, they can be put up in small heaps beside the dam and used time after time. The weight of the stones should be such as to keep the flax in suspension and not resting on the bottom of the dam.

After flax has been put into the steep it is advisable to make a boy tramp it down in the water for a few mornings at first, as it assists fermentation. If the weather be warm, it will rise a little in about three or four days, showing that

fermentation has commenced and, if this be the case, a few more stones should be added to counteract this tendency. In a few more days it begins to sink. Some of the weights could then be removed so as not to sink it to the bottom of the tank but allow the flax to remain in suspension.

From this time on attention and examination are necessary as, if all is going right, it may be expected to be sufficiently retted any time from the ninth day onwards. When the temperature is cold, or if fresh water has to be added, fermentation is retarded to a certain extent and the process lengthened.

To ascertain when the flax is ready to be removed from the steep, thrust the hand down into the middle of a beet. If it feels hard and wiry to the grip the examination may terminate for the time being. Repeat from day to day until it begins to feel softer to the grip.

A beet should be taken out from different places in the dam, opened and a few stems taken out and bent over the fingers of the left hand about four inches between the bends. If the woody part only bends, and does not break freely, and there is no appearance of loose fibre becoming detached from the stem, then it must be replaced and examined in like fashion till it be found that the medium-sized stalks—not the finest nor the coarsest—when broken at any place on the stalk allow the shove or bone of the stem to be extracted easily without injuring the fibre. Take hold of the fibre with the fingers and pull it downwards, doing this on several stalks, and if all, or most of them, pull out without breaking or tearing the fibre adhering to the shove, then the proper time has arrived for emptying the steep. If taken out at the time indicated by the above tests and appearances, and after draining for an hour or two on the banks, it may be drawn to a field for spreading out and drying.

Although the process of retting is, from its quickness of action in some cases, the most critical that the fibre has to undergo yet, with a little experience, it becomes a very easy operation to conduct safely. The tests are so simple, practical, an easy of application, that even the beginner need have no fear nor hesitation in undertaking it.

In a great many districts, I find that the majority of flax is spoiled from under retting. The inexperienced person, in his attempt at retting, becomes oppressed with a fear that he is allowing the process to go too far and all will be lost. He thinks the process will go on whilst the flax is being dried in the field. This is false, and no exposure on the spreading field can make up for watering, as, here again, the effects of the sun weakens the fibre.

Far better is it, should one have taken out the flax a day or so too soon, to let it remain in a rot-heap along the side of the steep for a day and a night before spreading.

When the flax is overwatered, there will be a waste in scutching, a great deal of the fibre becoming tow, but what will remain will be of a very fine silky appearance. When underwatered, the same waste will take place in the mill, an increased amount of power must be employed to free the shove from the fibre, cutting a great deal of the fibre away to tow. Further, what remains is ''harsh'' and coarse in quality.

A second lot of flax should never be steeped in the same water as a previous lot. This is a point which has been overlooked by a good many people. Such persons are apt to think, too hastily and without due consideration, that, as a matter of course, fermentation will take place more quickly in sour water than in fresh. But practice shows the reverse, and old flax water should not be allowed to sit in the bottom of the dams.

When running off flax water, it should not be allowed to get in contact with a stream of water which may have to be used for drinking, as this water contains poisonous matter in it. It does possess considerable manurial qualities, and could advantageously be run over grass land.

[TO BE CONTINUED.]

GRAIN FOR SALE.

SEED MAIZE.

To growers desirous of obtaining supplies of pure and reliable strains of improved seed, the following varieties are being offered and represent limited stocks raised from selected strains of Departmental seed:—

Yellow.—Improved Yellow Dent, Star Leaming, Reid's Yellow Dent.

White.—Boone County White.

CONDITIONS OF SALE.

Applications for seed, with accompanying remittance (exchange added) should be addressed to the Under Secretary for Agriculture, Brisbane. (*Postal address and name of railway station should be given.*) It will be taken for granted (unless otherwise specified) that a similar type and kind of grain to the one ordered can be sent as a substitute. This provision applies only in cases where orders exceed the available supply of seed.

Sales are limited to three bushels to any one applicant.

Advice will be sent when seed is despatched.

Purchasers are requested to write promptly after receipt of seed should any matters require adjustment.

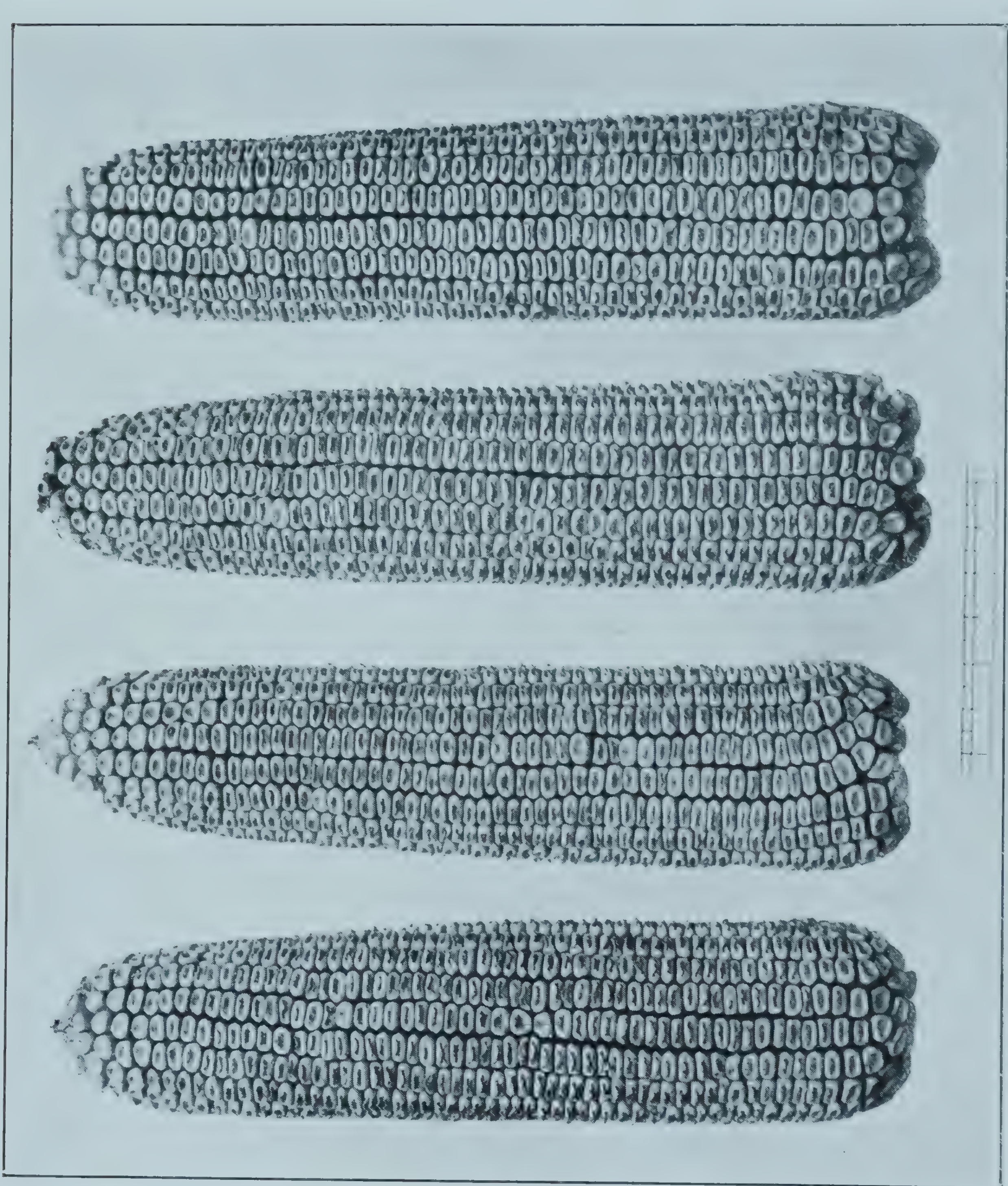
PRICES.

To enable applicants living at a distance to benefit, a flat rate of 15s. per bushel is being charged. This price includes all railage to the nearest railway station, but where steamer freight is necessary this and any charges in relation thereto must be paid by the purchaser, and the cost thereof added to the remittance.

Fifteen shillings (15s.) per bushel.

DESCRIPTION OF THE ABOVEMENTIONED VARIETIES OF SEED MAIZE FOR SALE.

Reid's Yellow Dent.—A medium early maturing variety of four months habit, averaging from 8 feet to 9 feet high. A prolific bearer, carrying a fair amount of foliage, though inclined to produce suckers or off shoots when sown on rich soils, and grown under very favourable conditions. The ears are borne midway on the stalk on a somewhat pendulous shank causing the ear to turn



down and so ripen off early. They are of good size, from 9 inches to 10 inches long, cylindrically shaped, carrying from 18 to 22 rows of tightly packed grain—a feature characteristic of this variety—showing the improvement effected by consistent selection. The grain is of medium size, block wedge-shaped in appearance, light golden colour with a dark amber base, medium hard character with a slightly rough crease dent. The cobs or cores are of red colour and of a hard nature.

This variety readily adapts itself to new conditions, and has proved a useful one where early crops are desired. Good results have been received from crops grown on the coastal belt and as far west as Roma.

Boone County White.—This is one of the heaviest yielding white varieties grown, and one that readily adapts itself to new conditions. A medium season variety, somewhat earlier than most maize of this type, taking from four to four and a-half months to mature. A fairly prolific bearer and a consistent yielder. The ears are exceptionally large, from 10 inches to 12 inches, and of large circumference, cylindrical in shape, carrying from 16 to 20 rows of tightly packed grain; being pendulous in habit, it is inducive to early ripening. The grain is of medium size, solid block wedge-shaped type of a hard, horny texture, wth a light starchy tip leaving a slightly rough dent. This variety has undergone considerable improvement, proven by the consistent yields obtained, and is recommended for areas contiguous to the coast.

Star Leaming.—This variety is but a new one to this State, though different strains of Leaming have been grown for many years past. Like the "Early Leaming," its habit is a very early one, which makes it important where seasonal conditions only admit of short season crops being grown and where early crops or catch crops are desired. It may be classed as a very early maturing variety from three and a-half to four months, of short, sturdy growth, from 6 feet to 8 feet, carrying abundance of foliage, and a characteristic bushy tassel producing quantities of pollen. The ears are of medium size, from 8 inches to 9 inches long, weighty and compact, carrying from 16 to 20 rows of well packed grain, being not unlike Reid's Yellow Dent in this respect; these are borne rather low on the stalk, semi-erect in habit, protected by a light close-fitting husk. rendering it an exceptionally easy variety to harvest. The grain is of medium size, stout block type, wedge-shaped in appearance, and of fairly hard nature, with a rich amber base and a distinct yellow soft tip cap, the grain possessing a rich golden colour. From consistent results obtained, this variety has many outstanding merits which rank it amongst the first of the short season kinds.

Improved Yellow Dent.—This is perhaps one of the best known and most extensively grown variety in this State. Numerous strains are met with in nearly all districts, all more or less emanating from the original "Yellow Dent." This variety has for many seasons undergone considerable improvement, and a type suitable to meet many of the State's requirements is now being offered. "Improved Yellow Dent" may be classed as a medium-late maturing variety, from five to five and a-half months, a strong, prolific grower, from 10 feet to 12 feet high, capable of giving large returns both of grain and fodder. The ears are of medium size, 8 inches to 10 inches, stout, cylindrically shaped, borne somewhat high on the stalk, semi-erect in habit, being well protected by a strong, tight, close-fitting husk; they are usually well filled, carrying from 16 to 18 rows of grain packed on the cob. The grain is of a rich amber colour, with a yellow tip cap; of medium hardness, and of a deep, flattened wedge-shaped appearance. The core is usually of a pink colour. This variety adapts itself readily to varying conditions, and has given splendid returns in many of the maizegrowing districts.

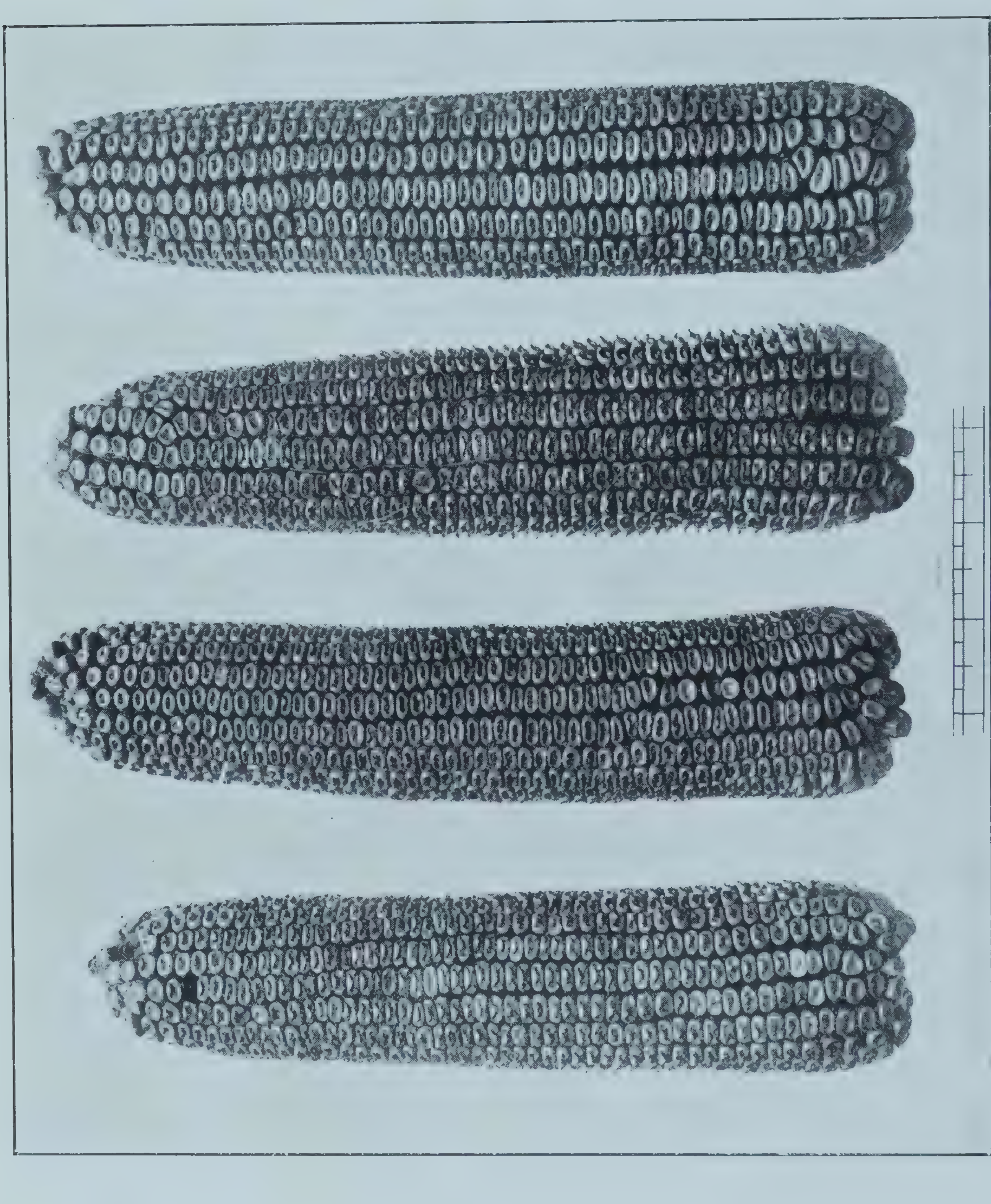


Plate 7—Star Leaming.

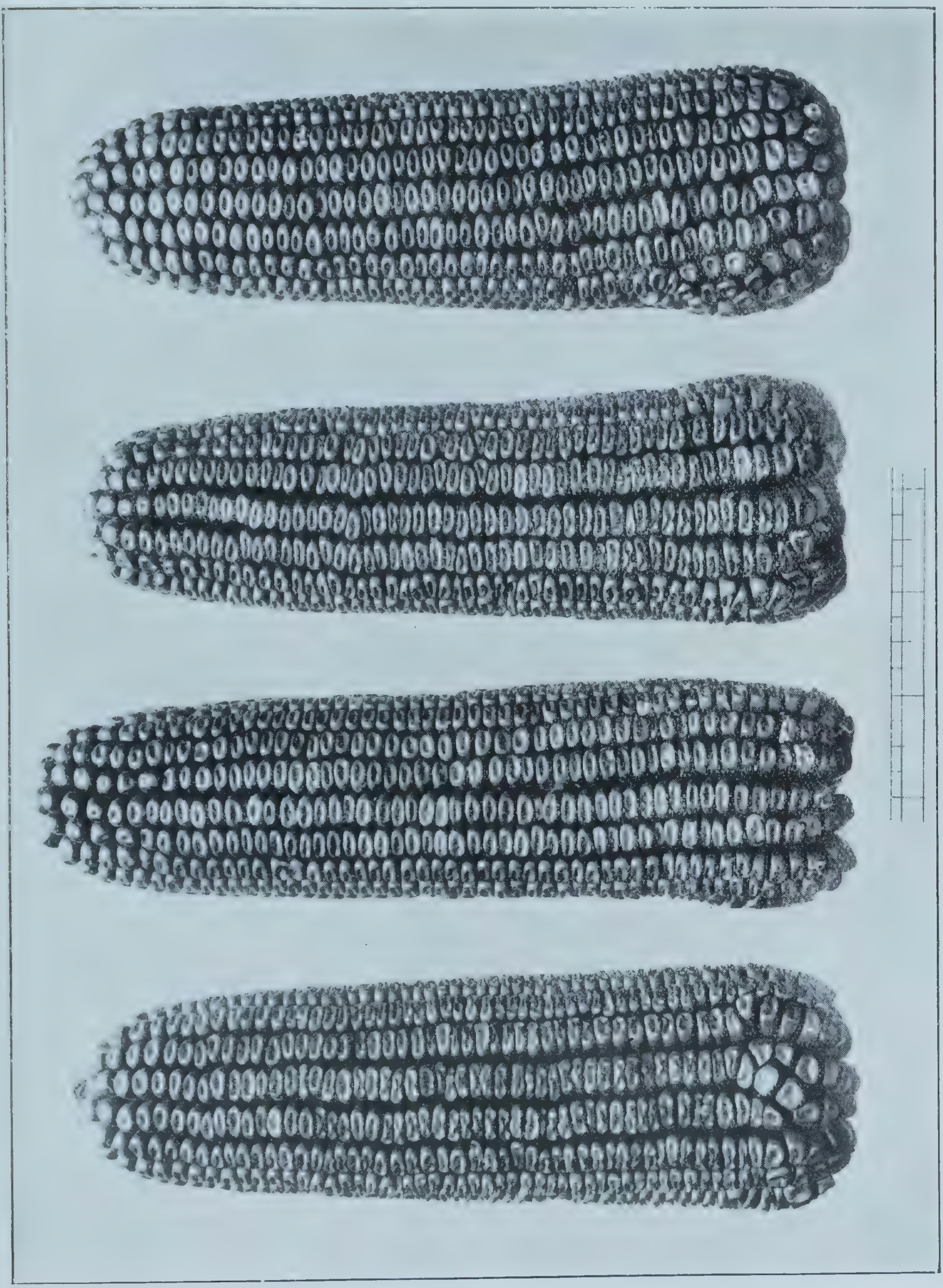


Plate 8.—Improved Yellow Dent.

Reid's Yellow Dent.

Boone County White.

Star Leaming.

Improved Yellow Dent.

PLATE 9.—SEED MAIZE.

MARKET GARDENING.

BEANS.

There is a considerable variety of beans for gardening purposes. These comprise French or kidney beans, including the stringless butter beans, pole beans, scarlet runners, broad beans, and lima beans. All these are annuals, except lima beans, which are perennials in districts where there is no severe winter cold. French beans may be grown all the year round in many parts of Queensland, but where frosts prevail the season may be reckoned from the middle or end of August until April or May. During these months, successive sowings may be made at intervals of two or three weeks when the ground is not too dry. Any good garden soil will grow French beans, but the best crops are obtained from good loams or alluvial soils. The drills should be a few inches deep, varying from 2 to 4 inches, according to the weather and the state of the soil. Make the rows 3 feet apart, and put the seed at least 6 inches apart in the rows.

Should the soil be very dry, water it well before sowing. The beans should be gathered as they become fit—that is, while young and tender; and, unless it is desired to save some for seed, they should not be allowed to ripen, as, thereby, the bearing power of the plants will be considerably lessened.

Pole or runner beans are summer plants, and may be sown from September to February or March. The rows for these should be 4 or 5 ft. apart, and, before planting, poles about 6 ft. long should be set up along the rows at a distance of 3 or 4 ft. apart. Around each pole plant 6 or 8 seeds, 2 in. deep, and when they come up thin them out, leaving four of the strongest plants to each pole. It may sometimes become necessary to tie the young tendrils to the poles at first, but as soon as they begin to run they will twine around the sticks naturally without any artificial help. Broad beans do not succeed well in the hot weather, their season being from March to September. Sow in drills 3 or 4 ft. apart, 3 in. or so deep, and the beans about 9 in. apart in the rows. When the plants come into flower, their tops should be pinched off in order to check the upward growth and cause the beans to set. If this pinching is neglected, in all probability the plants will continue to grow, most of the flowers will drop off, and there will be little or no crop. The beans should be gathered as they become fit whether they are wanted or not, so as to prolong the bearing season as much as possible.

Lima beans are a good crop to grow in the summer months, as they will stand any amount of heat and dry weather, and continue in bearing for a very long time. The dwarf or bush limas are perhaps the best to grow, as they require no poles, and consequently give less trouble. Lima beans may be planted in August or September, and again in November, and will continue to grow and bear until cut down by the frosts of winter. Dwarf limas may be planted in drills 3 ft. apart, and the seeds 18 in. apart in the rows or in hills of four or five seeds 3 ft. apart each way. The seeds should not be planted more than 2 in. deep, and should be placed in the ground edgeways, with the eyes down.

The pole limas require the same treatment precisely as other pole beans. French beans and most of the pole beans are *pod* beans, of which the edible part is the young and tender seed pod. Broad and lima beans, on the other hand, are *shell* beans, the part used for food being the bean itself and not the pod.

All of these, except the lima, must be used when young and tender. The lima bean may be used green (the bean itself, not the pod) or allowed to ripen, and stored for winter use. They will keep for a long time, and only require soaking in water before cooking to render them soft and palatable. They are the most delicious of the pod beans. Lima beans should be more extensively cultivated than they are, because they will succeed in dry seasons when other beans fail, and continue to bear right through the summer.

The varieties of French beans, including butter beans, are very numerous, and each grower must choose what best suits his requirements.

Of the limas, the largest and most delicately flavoured are Burpee's bush lima.

A good manure for beans is a light dressing of farmyard manure, 4 to 6 cwt. of superphosphate, and 1 cwt. of sulphate of potash (or 4 cwt. of kainit) per acre. The use of 2 cwt. of nitrate of soda per acre gives a very substantial increase of crop. An acre so treated has given an increase of nearly 50 per cent. Where 3¼ tons of French beans were obtained from an acre on which no nitrate of soda was used, 4½ tons were gathered on the same area as the result of its use.

Of late years much loss has been sustained by French bean growers owing to the destruction caused by the Bean Fly. On this subject, Mr. E. Jarvis, Assistant Government Entomologist, says:—

"Attempts to cultivate French beans in Southern Queensland are apt to prove more or less unsuccessful, and in some districts it is almost impossible to grow this

vegetable during the summer months. A crop may look promising at the start, but before long the young plants may show unmistakable signs of arrested growth, and become wilted and sickly looking, droop gradually, and at last topple over one after another in a most disheartening fashion.

"In the absence of any decided external evidence of injury, the grower is naturally somewhat at a loss to account for the cause of such failure, and is usually too disgusted to closely investigate the matter. In such cases, however, neglect is never advisable; and specimens of the affected plants, with particulars as to time of sowing and first notice of attack, &c., should be sent without delay to the Under Secretary of the Agricultural Department.

"The above symptoms are not due to climatic changes, or to the presence of fungi, but to the ravages of a small fly, the grubs of which tunnel in the stems and can easily be found if the skin of a badly attacked beanstalk be carefully peeled in places with a sharp pocket-knife. Such treatment will disclose a number of tiny pale-yellow maggots, about one-eighth of an inch long, lying close to the surface; and careful scrutiny will reveal the presence of still smaller, reddish, seed-like bodies, immediately under the dried skin, which are the pupæ from which these destructive little insects will ultimately issue."

The remedies he suggests are:—

1. Grow a small catch-crop of Canadian Wonder beans very early in the season to meet the first brood of flies, and when these plants are found, upon examination, to be harbouring good-sized grubs, pull them up and burn them without delay.

2. Root up and burn all old bean plants immediately they have ceased to become profitable.

This and the preceding method of control are of the greatest importance, and will well repay growers for any trouble or loss of time incurred.

3. Protect the stems by hilling them up with soil until covered. (Mr. Froggatt says that Sydney market gardeners adopt this plan, which, in good growing weather, enables a damaged plant to root afresh above the injured portion.)

A FARMER'S REMEDY FOR THE FRENCH BEAN FLY.

Referring to the Bean Fly, Mr. R. J. Scott, of Wanda, Walla (Mount Perry district), says:—

"My first experience of this fly in the Brisbane district was in the autumn of 1893-4, ten years before the dates mentioned in the article; and I would like to add, for the benefit of unfortunate growers, my plan for combating the fly. Four days, say, after planting the seed, cover the rows with a light layer of sawdust. Then wet this with a dressing of kerosene emulsion with a watering-can. When the plants are in the second leaf, again dress with the emulsion. To make kerosene emulsion, I use 1 lb. of ordinary soap, cut up, and dissolved in about 2 gallons of boiling water. When dissolved, add cold water to 4 gallons and three-quarters of a pint of kerosene, well stirred in with a flat piece of board. The emulsion must be warm when used, and kept well stirred."

This is a very simple remedy, and well worthy of a trial by gardeners and others who frequently suffer the loss of an entire crop owing to the ravages of this fly.

HOW TO MAKE DWARF TREES.

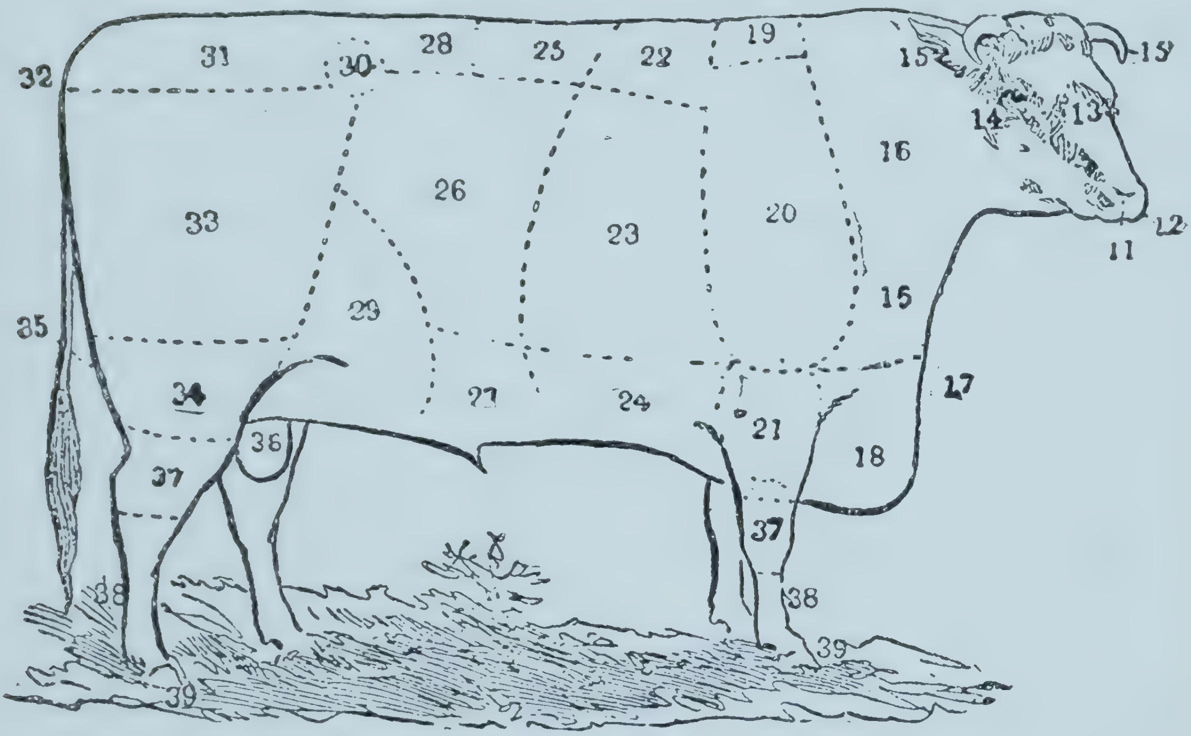
Some years ago there were to be seen on the upper veranda of a Chinese or Japanese business house in Wickham street, Fortitude Valley, three or four dwarfed orange trees in pots, which had fruited freely. From what we could gather as to the method adopted in dwarfing orange and other fruit trees, it appeared that the following method was employed:—Take an orange, and, having cut a small hole in the peel, remove all pulp and juice. Fill the skin thus emptied with some cocoanut fibre, fine moss, and charcoal, just stiffened with a little loam. In the centre of this place the seed or kernal of any tree that it is proposed to get a dwarf from. Place this peel in a vase or tumbler in a window, and moisten the contents occasionally with a little water through the hole in the peel, and sprinkle the surface with fine wood ashes. In due time the seed will push up a stem through the compost, and its roots through the orange peel. The roots must then be cut flush with the peel, and the process repeated frequently for some time. The stem of the tree will assume a stunted, gnarled appearance, making it look like an old tree. When the ends of the roots are cut for the last time, the orange peel which, curiously enough, does not rot, may be painted black and varnished, or the tree may be transferred to a pot.

Pastoral.

POINTS OF BEEF CATTLE.

The late Mr. P. R. Gordon, who, for several years, held the responsible position of Chief Inspector of Stock, in the Queensland Department of Agriculture and Stock, was an acknowledged authority on the subjects of stock and stock-breeding. In one of the valuable publications he placed before stock-breeders was one which will well repay re-perusal, on the points of the Shorthorn Bull, and reads as follows:—

Points of Short Horn Bull.



The plate of a Shorthorn bull, with the points indicated on it, so far as they can be so, is—as was the case with the preceding two—copied from Mr. Alexander Bruce's writings on the subject. In all previous schedules of points of cattle that have come under my observation no attempt had been made to expressly classify the points of, perhaps, the greatest importance from a breeder's point of view—namely, those that cannot be represented by diagram. They have been given special prominence in the following schedule. In working out the schedule, I had before me several scale of points, and in these I found that to restrict the aggregate of points to 100 would be to unduly undervalue many of the minor points, and without departing from the decimal system I have adopted one of Mr. Bruce's alternate aggregates—namely, 250. I have selected the Shorthorn for the purpose of scale of points; but the other beef breeds—namely, Hereford, Devon, and Aberdeen Angus—are so similar that the scale will apply to them, or any other beef breed of cattle.

The first 10 points cannot be shown by diagram.

DESCRIPTION OF POINTS, AND THEIR VALUES.

1. "Pedigree."—According to standard in Herd Book—20 marks.

2. "Offspring."—The character of offspring as shown by their success at shows—20 marks.

3. "Carriage and Style," is that form and carriage at once recognised, with the lines of the body not sharp or abrupt, denoting purity of blood and high breeding—10 marks.

4. "Size."—The preferable size is a medium one approaching to large; extra large animals are, as a rule, less hardy, and require proportionately more and better food—7 marks.

5. "Vigour" is indicated by width of forehead, well-developed neck and horns, roundness and capacity of barrel, and robust and muscular appearance—value, 10 marks.

"Quality."—Which may be described as certain external properties, which may be seen and felt, indicative of high breeding, a disposition to early maturity, and of having the frame, especially in the prime parts, covered with valuable meat, and the fat evenly distributed throughout the whole carcase. Of quality, there are two sub-divisions—(1) "General quality," and (2) "Head." In the former sub-division 6 points are allotted, namely:—

6. "Bone."—As shown in that of the leg under the knee, should be fine, but not so fine as to indicate weakness of constitution. Coarseness of bone is incompatible with "quality." In coarse large-boned animals a great proportion of the nutriment in the food goes to making and supporting bone, which in the fine-boned beast is made into meat—value 6 marks.

7. "Colour" should be any variety of red and white, as roan, or red and white, or altogether white. The richer the colour the better; but red inclining to black, or light red inclining to yellow, is objectionable, as well as red and white spotted—value, 4 marks.

8. "Hair" should be fine, long, wavy, silky, and abundant, with soft mossy undergrowth—value, 6 marks.

9. "Handle."—That is, touch and handle.—The quality of an animal with respect to touch is ascertained by a slow, comparatively light, but firm pressure with the points of the fingers on the different parts of the animal, especially along the chine, back, ribs, loin, and rump, and on the hip or hook bones; and if it is in fair condition, and stands well in this point, the feeling under the fingers will be firm, but yielding, which indicates the existence of fat between the skin and flesh, and aptitude to fatten. The flesh itself should be yielding and elastic, especially on the ribs, point of the rump, and at the setting on of the tail. In handling, the thickness and elasticity of the skin must be ascertained. It should be of medium thickness, and not so thin as to indicate that the animal can undergo no hardship; neither should it be loose, but moveable, mellow, soft, yielding, and elastic. Value of touch and handle, 12 marks.

10. "Evenness of flesh and fat."—The meat should be evenly, fairly, and deeply laid on over the whole carcase, especially on the prime parts, and the fat should be fairly distributed throughout the whole. Patchiness on the shoulders, ribs, loin, or rump—especially on the last—is a decided fault in young stock, as the fat, instead of being evenly distributed throughout the carcase, as indicated by the marbled appearance of first-class meat, is largely collected at the patchy parts—value, 7 marks.

In the "Head"—the second subdivision of quality—there are seven points, described as under:—

11. The "Muzzle" should be broad, full, and dewy. The colour should be cream, orange or light drab, but never smoky or black, which indicate inferiority of blood—value, 3 marks.

12. The "Nostril" should be wide, high, and open—2 marks.

13. The "Forehead and Face."—The forehead should be short and broad, denoting vigour, while in the cow it should be longer and narrower. The face should be comparatively short, lean of flesh, and somewhat dished or concave—value, together, 5 marks.

14. The "Eye" should be prominent, bright, mild, lively, and trustful, and the expression should be cheerful, open, gentle, and contented—value, 4 marks.

15. "The Horn and Ear."—The horn should be comparatively short, moderately thick, well-shaped, flattish and waxy, not clean and white, nor blackened, except at the extreme tips. It should incline outwards, and not much upwards,—value, 6 marks. The ear should be large, thin, yellowish inside, erect, lively in action, and hairy—value, 1 mark; total, 7 marks.

"Form" means symmetry and utility of carcase—*i.e.*, a handsome, well-developed, healthy frame, with lines straight above and below, and fulness and largeness in all the prime parts, and smallness in the inferior, or offal.

Of "form" there are four subdivisions—(1) forequarter, (2) middle, (3) hindquarter, and (4) legs; and in the first of these subdivisions—forequarter—there are 9 points, namely:—

16. The "Neck and Throat."—The neck should be clean, somewhat long and arching (bull-necked), which shows strength and masculine vigour, a most essential point; but the rise of the arch of the neck should never extend to the shoulders,

and the neck should be fine at the setting on of the head. The neck-vein ought to be well developed, and should run full and evenly into the shoulder. The throat should be fine, clean, and free from superfluous skin—value, 8 marks.

17. The "Breast."—The space between the forelegs, viewed in front, should be wide, full, and swelling, indicating thickness through the heart and capacity of chest—value, 4 marks.

18. The "Brisket" should be full, deep, broad, and projecting forward in front of the leg, and downwards nearly to the knee. There should be no dew-lap, beyond a slight pendulous thread. Although a deep brisket is not an absolute guarantee of a deep chest, the two generally go together. A deep brisket is not always to be met with in well-shaped cattle, but it is indicative of a propensity to fatten—value, 3 marks.

19. The "Crops"—the top of the shoulder—should be full and well covered with flesh, but not too wide. If they are very thick, straight, and open, the animal will never have good action—value, 4 marks.

20. The "Shoulder" should be well developed, and covered with muscle from its point to the crops. The shoulder-blade should be fairly laid back to ensure action, and a good fore flank. A too upright shoulder invariably entails a protuberant, bare shoulder-point and meagre fore flank—both bad faults—value, 8 marks.

21. The "Forearm" should be broad, large, straight, and muscular,—value, 3 marks.

22. The "Chine"—the space between the crops and back—should be round, and so full as to leave no hollow behind the shoulder. Nothing can compensate for a deficiency in this respect. It takes away substance from one of the very prime parts. The top of the chine should be on a level with and run well into the back—value, 9 marks.

23. The "Foreribs" should be round (hooped), deep and capacious throughout, running down wide and deep to give plenty of room for the heart and lungs. They should especially stand well out behind the shoulder. A bull with bad foreribs and a narrow contracted chest—hollow behind the shoulder—should be set aside, whatever other good qualities he may possess. A well-known authority has said, "There must be ample room for the heart to beat and the lungs to play, otherwise sufficient blood for the purpose of nutriment and strength will not be circulated, nor will it undergo the vital change which is essential to the proper discharge of every function." Deficient in this respect he is literally a "bad-hearted" animal, and his stock will lack vigour of constitution, and be liable to succumb to disease—value, 5 marks.

24. "Foreflank" should be deep and well developed, and should run full and evenly into the shoulder—value, 6 marks.

In the middle subdivision there are five points, described as follows:—

25. The "Back" should be straight and broad, and on the same level as the chine and loin. It should be well covered with flesh, and should run full and wide into the loin—value, 5 marks.

26. The "Back Ribs" should spring roundly in an arch from the back, and run well back towards the hindquarters, so as to leave little space between the ribs and the hips or hooks—*i.e.*, to be well ribbed home (a most essential point), while the two or three last ribs should be broad, arching, and well let down—value, 8 marks.

27. The "Belly" should be neither tucked up nor too low in the middle—that is, "pot-bellied"—but roomy and fairly let down, giving space for a capacious paunch. There should be room for ample materials to keep up the necessary supply of blood—value, 3 marks.

28. The "Loin" should be full, level, broad, and well covered with flesh. When properly developed, it should appear to extend far along the back. It is a prime part of the carcase, besides giving additional strength to the animal; and in moderately fat animals, at least, it is one of the points by which a purchaser is guided in judging as to their condition—value, 10 marks.

29. The "Flank" should be full, swelling, low, and deep. This, too, is one of the chief points noticed by the buyer in judging as to the condition of cattle, and ought for this and other reasons to be cultivated—value, 10 marks.

The Hindquarter subdivision comprises seven points, described as follows:—

30. The "Hip or Hook."—The width, measuring from the crown of one hip bone to that of the other, should be comparatively wide, but not protruding, nor too large. It should be on a level with the loin and rump. The hip bones should be well covered, and feel comparatively soft to the touch—value, 3 marks.

31. The "Rumps."—The length from the crown of the hip to the point of the true rump, and the width across behind from point to point, should be long and wide, square and level on the top, with the space between the hip and the tail and the points of the rumps well filled up with flesh and fat, without patchiness or gaudiness. A wide, long, level, well filled up rump, and a good handle at the tail and haunch, are sure indications that the animal is of the right sort; and these points are also of importance through the meat on them being all of the primest quality—value, 10 marks.

32. The "Tail and Set-on."—The tail should be set symmetrically on a level with the rump, loin, and back. It should be strong and broad at the root, but rapidly tapering to fine and round at the brush. It should, when not raised, fit neatly in between the points of the rump bones. It should neither rise at the root, with a cock or curve, above the level of the rump, nor should it run far up the rump nor droop—*i.e.*, it should be set square on—value, 7 marks.

33. The "Quarter"—the length and width below the rump and above the thigh—should be wide, level, and square. It should come down straight and full to the thigh, but it should not be rounded like that of a horse, which is a sure sign of coarseness—value, 6 marks.

34. The "Thigh" should be broad, strong, short, and well-developed—value, 4 marks.

35. The "Twist"—the filling up between the thighs—should be full, broad, well filled, making the thighs meet low down—value, 8 marks.

36. The "Testes" should be well developed—value, 2 marks.

37. "Knee and Gambril, or Hock."—The fore knee should be broad in front, clean, and well developed. The gambril (or hock) should be long, broad, clean, muscular, and nearly straight to the ground—value, 7 marks.

38. The "Leg" should be short, straight, wide-set, clean, and well proportioned, and under the knee and gambril it should be moderately fine and sinewy—value, 2 marks.

39. The "Hoof" should be clean, short, and well proportioned—value, 1 mark.

Recapitulation.

	Value, Marks.		Value, Marks.
Pedigree, &c.	20	Shoulder	8
Offspring	20	Forearm	3
Carriage and style	10	Fore flank	6
Size	7	Back	5
Vigour	3	Back ribs	7
Bone	6	Belly	3
Colour	4	Loin	10
Hair	6	Flank	10
Handle	12	Hip	3
Evenness of flesh	7	Rump	10
Muzzle	3	Tail and set-on	7
Chine	9	Quarter	6
Nostril	2	Thigh	4
Fore ribs	5	Twist	8
Forehead and face	5	Testes	2
Eye and expression	4	Knee and hock	7
Ear and horn	6	Leg	2
Neck	8	Hoof	1
Breast	4		
Brisket	3	Aggregate	250
Crops	4		

STINKING ROGER AS SHEEP FODDER.

Lately we were asked if the ill-smelling weed known as "Stinking Roger" could be utilised in any way for fibre or stock feed. We had never heard that this pestiferous plant was of any use economically; but the following paragraph in the Perth "Farmer," would lead to the belief that it may be good sheep feed. That journal says:—

"Giving evidence before the Royal Commission on Agriculture in October, 1916, Mr. Maitland Leake, referring to the prevalance of weeds, said:—'There is a farm adjoining us which is entirely overrun with Stinking Roger. It has completely

spoiled his crop with the exception of about 30 acres. . . . . It is good sheep feed and we are keeping it down (with sheep). We have neighbours on either side who have the roger on their land, but it has not affected us because we can keep it down. Sheep do wonderfully well upon it. Mr. Heuston will be giving evidence, and he will tell you how long he has had sheep on the roger, and how well they have done on it. I have been surprised myself.'

"Mr. Heuston, to whom Mr. Leake referred above, gave evidence on this plant later. He said: 'We run 400 sheep at the present moment. We have only been running stock during the last twelve months, but during the last four months 150 acres would carry 400 sheep. That is because of the Stinking Roger weed. I find it very satisfactory feed. Sheep do well on it.'

"It looks as if there was something to be said in favour of even Stinking Roger. Possibly settlers in the very dry areas may even find a welcome for it."

CAN FIBRE BE MADE FROM EUCALYPTUS BARK.

The Perth "Farmer" has the following article in the affirmative:—

From the bark of the eucalyptus trees, which cover millions of acres of Australia, can be produced a fibre which, it is claimed, will make the Commonwealth independent of Indian jute goods and New Zealand flax, save millions of pounds annually from being sent overseas, and create employment for thousands of Australian workmen, while at the same time supplying the consumers with goods at less cost than, but of equal quality to, the imported article.

The originator of this proposition (says an exchange) is an Australian in the prime of life, Mr. W. M. Billings, whose researches and experiments of the past fifteen years on his farm and workshop at Wonga Park have now passed the stage of theory and entered the zone of practical economics. At his model factory on the banks of the Saltwater River at Footscray, near the swing bridge, Mr. Billings exhibited samples of twine, rope, and sacking made from eucalyptus fibre, together with sundry marketable by-products of the industry, which themselves possess potentialities hardly less in magnitude than the primary products of the bark.

The three main essentials in fibre production are declared by Mr. Billings to be fully complied with in his process, namely—the staple is of good length, the product is strong and durable, and the cost of manufacture is low. Indeed, enormous advantages as to cost of production are claimed on behalf of the new process of manufacture.

Mr. Billings has offered the process and other rights to the Returned Soldiers' League for development solely in the interests of the returned soldiers. Should the inventor's claims justify themselves under rigid investigation and exhaustive trial, and should it be able to persuade the Minister to give his support, an industry could be inaugurated which would be capable of great expansion and would largely help to solve the unemployed soldier problem.

The raw material, the bark of many species of eucalyptus, can be obtained very cheaply in inexhaustible quantities for the cost of stripping and freight, the tree trunks being available for sawn timber, posts and rails, palings, or firewood. Hundreds of tons of bark now discarded as useless at the bush sawmills may be made to produce a greater sterling value in fibre than the entire timber products of the mills. Surely this is an industrial and economic romance—one of those victories for which peace is justly renowned.

In the factory the bark is passed first through a "softening" machine, which loosens out the fibres, it then goes on to a carding machine, when the disintegrated fibre is conveyed to a spinning machine to be spun into yarn. Mr. Billings had to invent and manufacture his own machinery for carrying out his process, but he is now able to demonstrate on a commercial scale the capabilities of his propositions.

Nothing of the bark is wasted, and Mr. Billings declares that 100 lb. of bark produces 100 lb. of marketable products. He guarantees to be able to prove amazing financial results, but he sits down hard on the dictum that the soldiers are to have the first chance to the industry. He says they have earned that right.

Poultry.

REPORT OF EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1919.

The laying for the month has been very satisfactory. Nearly every pen responded to the improved weather conditions. Broodies have given very little trouble in the single pens, the majority coming from the heavy group section. The health of the birds has been good, only one death having occurred, which took place on the last day of the month. The winners of the winter test cannot be given until the weights of the eggs have been taken; this will be done during the early part of August. The highest single scores for the month were as follows:—F. W. Leney's Black Orpingtons, 29; J. M. Manson's White Leghorns, 27; J. Ferguson's Chinese Langshans, 26; H. Puff's Rhode Island Reds, 26. The following are the individual records:—

Competitors.	Breed.	June.	Total.
	LIGHT BREEDS.		
*J. M. Manson	White Leghorns ...	145	488
*W. Hindes	Do.	131	481
*Dixie Egg Plant	Do.	133	466
*T. Fanning	Do.	142	452
*E. A. Smith	Do.	131	428
*Dr. E. C. Jennings	Do.	128	417
*Haden Poultry Farm	Do.	123	415
*G. W. Hindes	Do.	125	412
S. McPherson	Do.	129	402
*Range Poultry Farm	Do.	121	398
G. J. Byrnes	Do.	125	381
*C. P. Buchanan	Do.	114	372
*Quinn's Post Poultry Farm	Do.	115	369
G. Williams	Do.	109	368
J. H. Jones (Toowoomba)	Do.	123	367
*B. Caswell	Do.	107	358
*H. Fraser	Do.	118	358
*W. Becker	Do.	109	349
S. W. Rooney	Do.	121	348
H. A. Jones (Orallo)	Do.	107	341
W. A. Wilson	Do.	122	337
*W. Lyell	Do.	105	336
*L. G. Innes	Do.	120	320
*Mrs. L. F. Anderson	Do.	131	319

EGG-LAYING COMPETITION—*continued*.

Competitors.	Breed.	June.	Total.
	LIGHT BREEDS—*continued*.		
*J. J. Davies	White Leghorns ...	126	317
*Mrs. R. Hunter	Do.	105	316
G. H Kettle	Do.	113	295
Geo. Trapp	Do.	94	292
*Mrs. A. G. Kurth	Do.	120	286
Oakleigh Poultry Farm	Do.	1 5	279
*Thos. Taylor	Do.	103	278
Mrs. N. Charteris...	Do.	93	269
B. Chester	Do.	104	267
H. O. Jones (Blackstone)	Do.	111	266
C. A. Goos	Do.	102	259
R. C. J. Turner	Do.	86	255
*O. W. J. Whitman	Do.	93	238
J. H. Dunbar	Anconas	107	230
W. Morrissey	White Leghorns ...	91	224
J. W. Newton	Do.	110	215
N. A. Singer	Do.	110	214
	HEAVY BREEDS.		
*E. Holmes	Black Orpingtons ...	153	544
*E. M. Larsen	Do.	131	481
*R. Burns	Do.	152	469
Geo. Nutt	Do.	124	468
*E. F. Dennis	Do.	150	463
*A. E. Walters	Do.	128	452
*Kelvin Poultry Farm	Plymouth Rocks ...	144	429
*A. Shanks	Black Orpingtons ...	133	428
*W. Smith	Do.	118	424
*E. Morris	Do.	130	416
*D. Fulton	Do.	115	408
*Nobby Poultry Farm	Do.	127	404
*Jas. Ferguson	Chinese Langshans ...	124	377
*H. Puff	Rhode Island Reds ...	127	362
*W. H. Reilly	Chinese Langshans ...	126	356
*T. Hindley	Black Orpingtons ...	118	338
A. Homan	Do.	131	313
Burleigh Pens	Do.	97	312
*Mars Poultry Farm	Do.	120	288
*T. B. Barber	Do.	103	279
C. H. Singer	Do.	102	268
*F. W. Leney	Do.	134	266
J. A. Cornwell	Do.	131	243
R. B. Sparrow	Do.	101	237
A. Gaydon	Do.	107	202
H. Ashworth	Do.	93	183
Total	...	7,946	23,192

* Indicates that the pen is engaged in single hen test.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	79	77	84	83	81	84	488
W. Hindes	92	85	79	66	79	80	481
Dixie Egg Plant	79	69	87	91	68	72	466
T. Fanning	86	58	78	81	72	77	452
E. A. Smith	66	67	85	70	59	81	428
Dr. E. C. Jennings	74	49	74	70	67	83	417
Haden Poultry Farm	79	79	75	67	53	62	415
G. W. Hindes	79	52	82	71	62	66	412
Range Poultry Farm	45	68	80	85	50	70	398
C. P. Buchanan	46	78	62	55	62	69	372
Quinn's Post Poultry Farm ...	51	69	79	71	54	45	369
B. Caswell	49	12	63	83	87	64	358
H. Fraser	38	63	78	61	50	68	358
W. Becker	88	68	79	44	12	58	349
W. Lyell	40	73	72	57	47	47	336
L. G. Innes	29	70	36	63	66	56	320
Mrs. L. Anderson	61	73	37	41	46	61	319
J. J. Davies	41	40	60	63	66	47	317
Mrs. R. Hunter	47	62	60	58	49	40	316
Mrs. A. G. Kurth	69	52	61	47	17	40	286
Thos. Taylor	65	27	24	68	66	28	278
O. W. J. Whitman	29	62	36	31	42	38	238
HEAVY BREEDS.							
E. Holmes	96	99	101	83	102	63	544
E. M. Larsen	84	93	71	88	91	74	481
R. Burns	79	77	80	102	60	71	469
E. F. Dennis	92	53	91	80	52	95	463
A. E. Walters	76	77	90	71	55	83	452
Kelvin Poultry Farm	98	58	60	61	81	71	429
A. Shanks	35	45	93	88	75	92	428
W. Smith	42	90	67	62	94	69	424
E. Morris	76	71	70	70	89	40	416
D. Fulton	73	73	76	55	75	56	408
Nobby Poultry Farm	57	58	55	79	79	76	404
Jas. Ferguson	72	82	57	48	53	65	377
H. Puff	77	30	67	79	58	51	362
W. H. Reilly	53	47	68	74	54	60	356
T. Hindley	85	70	21	63	52	47	338
Mars Poultry Farm	32	77	77	17	15	70	288
T. B. Barber	36	57	48	56	56	26	279
F. W. Leney	33	53	63	79	12	26	266

IMPORTANCE OF CLEAN WATER FOR FOWLS.

It frequently happens that fowls which have not access to permanent water are neglected, in that fresh water is not supplied to them daily at least twice. Another neglected duty is the regular cleaning of the drinking vessels, in the water of which may be seen a shiny film of greasy matter. The proper thing to do is to scald the drinking troughs or tins. If this be not done regularly, disease is pretty certain to attack the birds.

THE BLACK ORPINGTON FOWL.

THE EVIL WORK OF THE FANCIER.

Probably no breed of domesticated poultry has been injured by the fancy craze to the same extent as the Black Orpington. Before the fanciers did their best to destroy the utility value of this breed it is doubtful if there was any better general purpose breed extant. Breeders of the fancy type of Orpington declare that the utility breeders at the present time, in aiming at a more active, more tightly feathered, and generally a more attractive bird, are getting away from the Orpington type, and are developing a mongrel specimen of the breed. As a matter of fact, utility breeders in aiming at their ideal are merely endeavouring to reconstitute the type that Cook, the originator of the Orpington, evolved. To prove the truth of our contention, we publish herewith pictures of the Black Orpington taken from the eighth edition of the "Practical Breeder and Feeder," by William Cook. In referring to the illustration of the cock bird, Mr. Cook says: "The illustration of this variety will give my readers a good idea of what the breed is, as it is a true representation of one of my best specimens." It is cheering to go back and read this old work of Cook's on his favourite breed. He says: "The plumage is very glossy in both sexes, but more particularly in the cock. The sheen should be much the same colour as that of a good Langshan. Single comb, evenly serrated in both sexes, standing erect in the cock, not large, but neat; very deep and long in the breast; red face; black legs, not too long; white toe nails, four toes on each foot, well spread out from each other. The hen's comb may fall a little to one side if it is evenly serrated and without folds in it. The large comb in some breeds denotes good laying quality. It also means that the best laying fowls have to be sacrificed because their combs are large, and the judge passes them over. This in a great measure destroys the utility of poultry, which should be *vice versa*. Poultry clubs and societies should award prizes to those which are capable of laying the largest number of eggs in twelve months. *If judges would but study the laying qualities and shape of the fowls, and not spend all their time on judging plumage, it would be more beneficial to poultrykeepers at large.* [The italics are ours—Ed. 'New Zealand Farmer.'] The proper feathers would soon follow if the other matters were attended to as they should be. In three years our poultry would be much improved, both in laying and table qualities. The birds would be a better shape, and in many cases their plumage would be better." These are words of wisdom, indeed, from the originator of our great dual-purpose breed. Would that we had more men like him dominating poultry affairs at the present time. One thing is very evident. Cook evolved the Orpington as a great utility fowl, and the men who have made a caricature of it—a glorified feather-duster—have done a wicked work in degrading one of the most valuable domesticated animals that has been created by the skill and intelligence of a master breeder. Could Cook see to-day what the best breeders of the Black Orpington—such a man, for instance, as the chief poultry expert—are producing as a standard type of the utility Black Orpington, he would doubtless congratulate them on recreating from the libel fanciers have made of his original type a bird approaching his own ideal of what the breed should be. That Cook's ideals should be those of the best men in the utility poultry world at the present day is a most encouraging fact. It is admitted that the craze for egg records has led to some strains of the Black Orpington departing from breed type, but the danger is recognised, and the best of our breeders of utility Black Orpingtons are doing all in their power to correct this degeneration. When we have capable judges at all our leading poultry shows the question of maintaining type will easily be settled.

WRIGHT'S REMARKS ON THE BREED.

From "Wright's Book of Poultry," Revised Edition. Published 1912.

With the fowls known by this name we enter upon a large class of modern breeds, produced by crossing from one or more of the original Asiatic races, including in every case some proportion of the Shanghae element. Most of them originated in America; but all those treated of in this chapter were produced in England, and some had quite different origins.

Writing in 1911, Mr. W. Richardson, of Horsham, Sussex, founder of the Buff Orpington Club and president of both the Black and the White Orpington Clubs, to whom we are indebted for notes on the black, buff, and white varieties, says—

"There is no breed of modern production in which so much interest is taken or over which there has been so much controversy as the Orpington. A good many fanciers of the older breeds raised at first all sorts of objections to them, but the opposition to their introduction only seemed to make their admirers more keen to develop the breed, with result that there are now probably more fanciers and breeders of Orpington fowls than of any other breed of poultry.

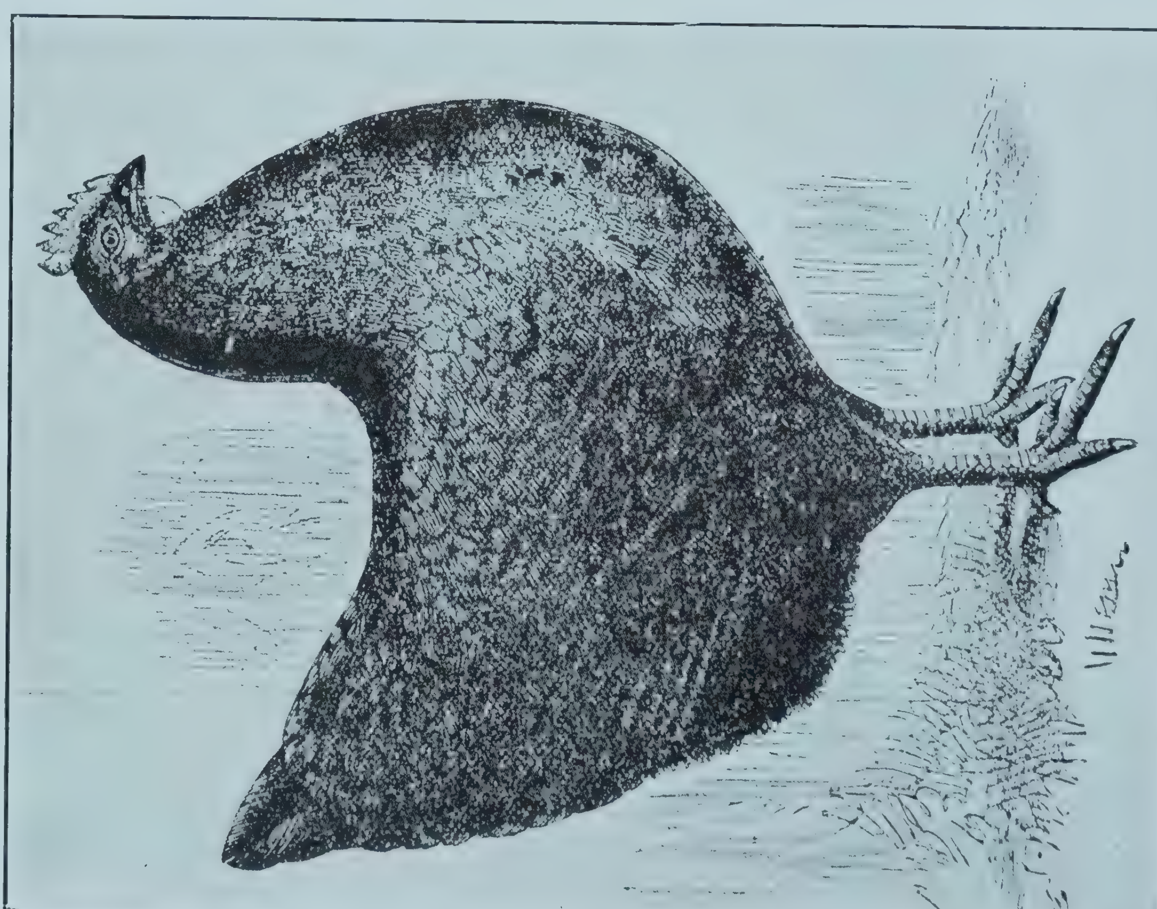


PLATE 10.—IDEAL TYPES OF THE BLACK ORPINGTON PICTURED WITH THE STRONG APPROVAL OF THE ORIGINATOR OF THE BREED, WILLIAM COOK, IN A WORK PUBLISHED BY COOK THIRTY YEARS AGO

"There are seven varieties of Orpingtons, and I will name them in the order of introduction to the public: Black, buff, white, jubilee, spangled, cuckoo, and blue. There are also rose-comb specimens of the black, buff, and white varieties. The first two are hardly ever seen now, but there are a few fanciers who breed the rose-comb white Orpington, which seems to be largely developed from the White Wyandotte, as the original single comb White Orpingtons never produced any rose-comb specimens."

The one to be first described, and the original Orpington, is so largely a Langshan that we should have included it in the previous chapter if it had stood alone. It was originated and pushed by the late Mr. W. Cook, then living at Orpington, in Kent,

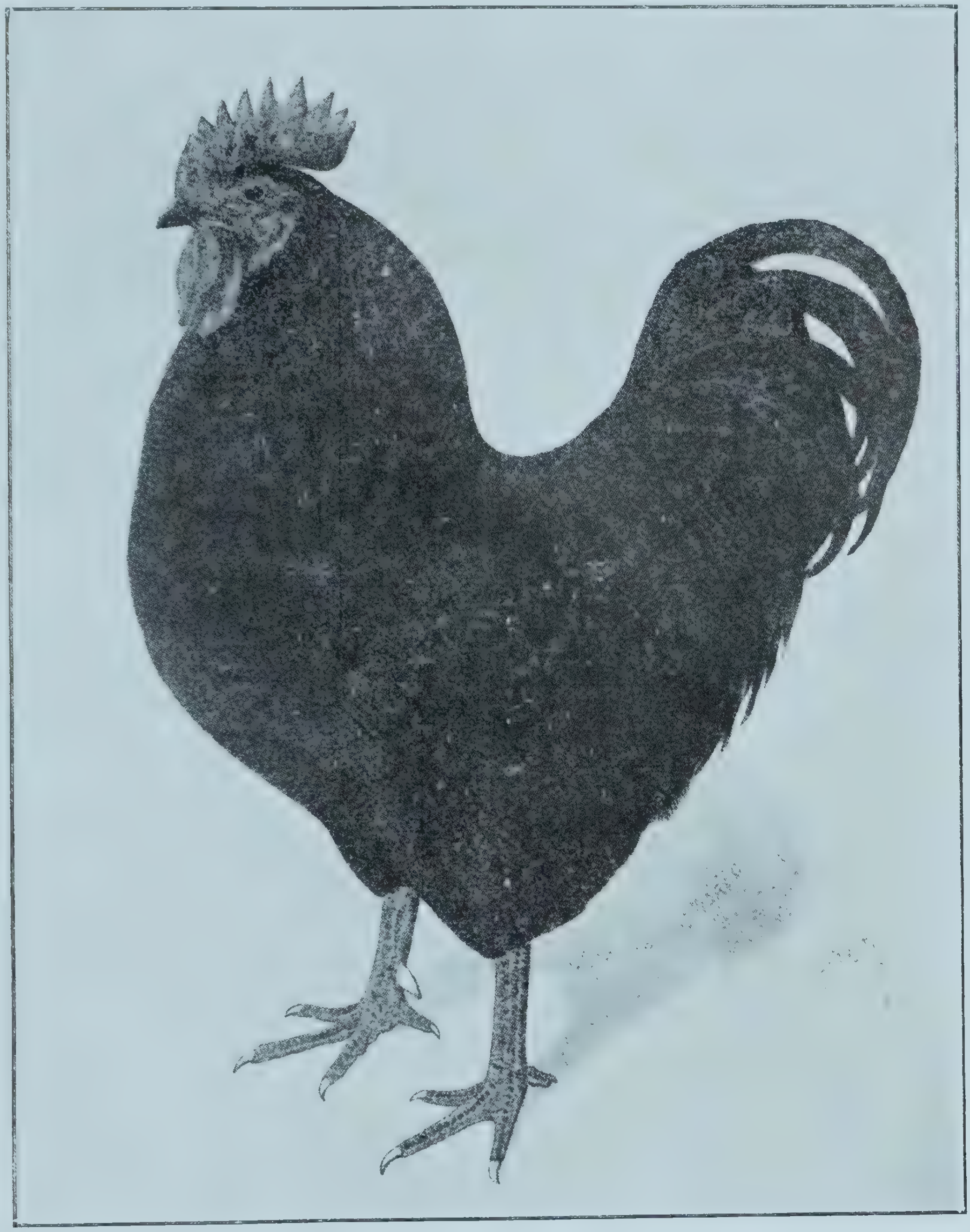


PLATE 11.—THE IDEAL BLACK ORPINGTON PICTURED BY THE "FEATHERED WORLD,' OF LONDON, IN ITS ISSUE OF OCTOBER 13, 1893, THE BIRD BEING OWNED BY W. PICKWORTH.

from which Kentish town he took the name. He stated that the method of production employed in regard to the singled-combed Orpington was to cross a large Minorca cock with black spots from Plymouth Rocks; pullets of this cross being then mated with clean-legged Langshan cockerels, and the produce carefully bred to a deep-bodied and short-legged type. The result was a black fowl with the green gloss of the Langshan, but with clean legs, of the plumper make of the original Langshan, with white skin and meat and a well-shaped carcase, and which is an excellent winter layer of brown eggs. The weakest point of the Orpington is that the eggs are not so large as might be expected from the size of the fowl; still they are, in single-combed strains, of a fair average size. Mr. Cook also produced a rose-combed Orpington from

PLATE 12.—THE IDEAL BLACK ORPINGTON AS PICTURED BY LUDLOW IN LEWIS WRIGHT'S GREAT WORK.

the rose-combed Langshans mentioned in the preceding chapter which had the same general qualities, but with the curious difference, which we are unable to explain, unless from some individuality of the rose-combed Langshans employed, that the eggs are smaller than from the single-combed. Owing probably to this difference, the rose-combed Black Orpington has never become generally popular.

There is no doubt that some original Black Orpingtons were produced as stated; but there is as little doubt that the breed has since considerably changed in two distinct directions. As stated in our next chapter, there is little question that one of the components of the Plymouth Rock was the Black Java fowl; and, as stated in the preceding, it is equally obvious that this Black Java has much in common with the Langshan, however that fact be interpreted. This darker and more typical component in the Asiatic blood was thus a double prepotency, and its predominance over the more Shanghae components would be intensified by breeding for clean instead of feathered shanks. This doubly strong element therefore rapidly overpowered the Minorca element, and the Orpingtons quickly became to all intents and purposes clean-legged Langshans, taking the place of that shorter-legged, symmetrical type once popular, but subsequently discarded by personal feeling of Langshan breeders. In addition to this tendency, in the early days of the breed it is known that clean-legged pure Langshans, from perfectly orthodox sources, were sold to Orpington exhibitors, and appeared immediately in exhibition pens, as well as being used for breeding with their stock. This still further strengthened and hastened the reversion to Langshan type, which was then so pronounced that at many shows only one class for Langshans or Orpington (or the converse) was provided for the two breeds. The index of this change has lain chiefly in the size of the eggs, which has somewhat lessened since the Minorca element lost power; and in the colour of the eyes, which was often red while any foreign element remained, but has now almost everywhere reverted to the Langshan brown or black.

There has been, however, quite another change, a Black Orpington of practically new blood coming upon the scene in 1891, when the late Mr. Joseph Partington exhibited at the dairy show in October two cockerels and two pullets, which secured first and second prizes in each class, three of the four birds being immediately sold at £30 each; notwithstanding which, at the Palace Show a few weeks later, he brought out fresh birds of each sex that beat these previous winners. These birds were of a size that had never before been seen, creating quite a sensation and considerable curiosity. Mr. Partington assures us that these Orpingtons also were cross-made birds, but had none whatever of Mr. Cook's original strain in them at all, and that he had deliberately started with the idea of breeding himself something in the same line, but more striking and handsome. They were very large, and of splendid colour, with massive shape, and all had dark eyes. These points made them invincible in the show pen, and from this new strain, combined with the original, are descended the bulk of the winners of the present day. Many of the new strain displayed so much more fluff than former Black Orpingtons that we cannot help thinking large females of either Black, White, or perhaps even Buff Cochin may have been employed with Langshan males.

Writing on the Black Orpington, Mr. W. Richardson says: "The first variety of the Orpington fowl to appear was the black single-comb and rose-comb. The birds were identical but for their combs, and the single comb variety was always much more popular.

"The Black Orpington is our handsomest black fowl, and to see the classes at the classical shows is a treat to a lover of black poultry. They are, as a rule, good layers of a nice brown egg, and, except for their black legs, a first-class table bird.

"The colour of the cock should be black, with a rich bottle-green sheen on all his feathers, free from bronze purple, purple barring or red or white in neck or saddle hackles. He should be massive, short, broad, and deep in body, showing a wide U-shaped curve on the back and underneath, and stand on short, straight legs, black in young birds and dark slate colour in old ones. There should be no red or yellow in feet or legs, and his toes should be well spread out and straight with white toe-nails. The comb, wattles, and ear-lobes should be medium in size and of a fine deep coral red, the comb should be straight, evenly serrated, and set firmly on his head. His eye should be dark-brown or almost black, the darker the better, and his beak should also be black or very dark horn colour. His plumage should be silky in texture and very abundant, and his tail and hackles should be flowing, but his tail should not be long nor the feathers too stiff.

"The hen's colour should be the same as that of the cock. She should look as massive as possible, her tail should be short, and she should have a nice wide rising cushion like the Brahma, rising gradually to the true tail feathers, as distinguished from the round ball cushion of the Cochin, which is very objectionable. The curve of her body should come straight down from her head round the breast, and passing under and up to her tail in a perfect wide U shape, the same as the curve on her back from head to tail.

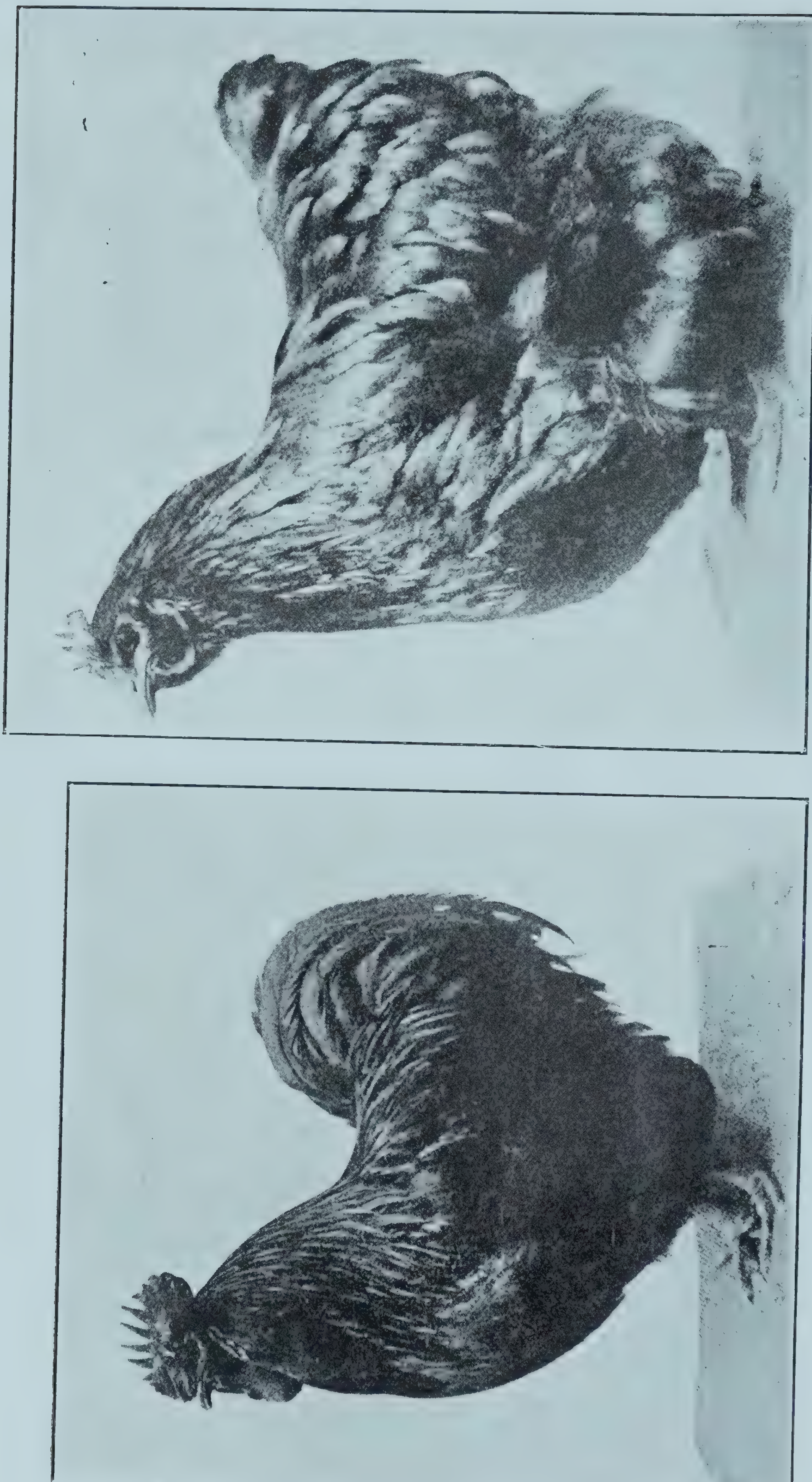


PLATE 13.—HOW A GREAT UTILITY BUT MOST HANDSOME BREED HAS BEEN DEGRADED BY THE FANCIER IN HIS CRAZE FOR MAKING FANCY FEATHERS THE CHIEF PRODUCT OF A FOWL.

This is the popular "fancy" Black Orpington of the present day which fanciers have persuaded many people into thinking is the true type of the breed instead of the caricature they have created.

"Some birds show a keel which is not required, and it rather spoils their outline and appearance. The weight of the cocks should be from 9 lb. to 11 lb., and that of the hens 7 lb. to 10 lb. Equally good cockerels and pullets can be bred from the same pen, which saves double mating, though some strains seem to produce better cockerels and others better pullets."

Colour should be bred for as in the Langshans, but the crimson between the toes is not required. Particular attention should be given to preserving the correct shape, with a broad and deep breast, the whole body looking massive and solid, and set rather low. Excessive fluff should be avoided, as tending to decrease laying, and being often accompanied by thicker skin; too small combs, also, are apt to be signs of diminished egg production. We have seen one or two specimens distinctly keeled, almost like some exhibition ducks, and this ought certainly to be deprecated. It is probably due to carelessness of these points that statements have lately appeared to the effect that some strains of the Black Orpington have not kept up its reputation as a good layer. Both abundance and size of eggs would, however, quickly respond to selection for these qualities, in the manner insisted upon in former chapters of this work.

JUDGING UTILITY ORPINGTONS.

The Poultry Show Society that can get a Government instructor to judge its birds is lucky. On the one hand, the ordinary fancier breeder has, in the majority of cases, an absolutely wrong conception of what utility men are aiming at, while there are few utility breeders in the country capable of judging according to breed character. For several seasons back we had an opportunity of witnessing the work of a leading poultry judge in utility classes. It was farcical. The feather type of Black Orpington won every time, while the leggier the light bird the better it was in his estimation. But this judge is mending his ways. We recently witnessed his work in a utility section again. He has altered his views. But he has gone to the other extreme. Instead of attaching main importance to type, he is judging on alleged indications of laying quality. Conformation, character, and expression are accounted apparently of little value, but the texture of the skin in the abdominal region and the length of breastbone are evidently the main deciding factors. He passed over one bird because the texture of the skin in the abdominal region was not fine enough, in favour of an absolutely coarse type which any amateur could tell had not the laying temperament. Fancy judges should be made to see once for all that birds in a utility competition are not supposed to be judged on alleged indications of laying power—the trap nest or single pen will decide the laying quality—but that superiority is to be determined more by correctness to type of the breed represented, the main difference between the utility and the fancy birds being that one is a natural specimen and the other is an exaggerated one. Of course, we do not expect the fancy judge to take our meaning from this last statement. He will naturally contend that his type is not an exaggerated type. But if he will study Ludlow's plates or pictures of any of the leading breeds before the extreme fancier got to work on them he may be persuaded to view the matter from the right standpoint.

COMMUNICATIONS.

Some time ago a communication was received from a progressive poultry-keeper in some part of the Dominion telling of his method of inbreeding, but though we can make a good guess at the signature, the writing of his address is still puzzling us. It is a common mistake of people to be a little careless in signing their names and writing their addresses. Because it is plain to them they think it is plain to others. Our correspondent, whom we would like to hear from again, concludes his letter with this statement: "I find if you make a new brooder, costing about 1s., for every fifty chicks, the death-rate is very low." We would like to have had some particulars of this interesting experiment, and just how this cheap and effective brooder is constructed.

STORING THE SUMMER SURPLUS.

Referring to the work of the late Poultry Conference, the Chief Poultry Expert, Mr. F. C. Brown, thus speaks of the matter of cool storage for the summer surplus of eggs:—"It was even more satisfactory to learn from an Auckland delegate that his circle had in cool store no less than 50 tons of pulped eggs for use during the scarce season, besides large quantities of eggs in shell. This is how it should be. Any surplus should be preserved on the circle's own account rather than allow others to do it, and reap the reward as a consequence. No doubt other circles will follow the excellent principles adopted by the Auckland circle. Once this becomes more general it will go a long way towards bringing about a more uniform price for eggs throughout the year." It is especially satisfactory to have Mr. Brown's commendation of this principle. Shortly after the Auckland Egg Circle was formed the editor of the "Farmer" made a personal appeal to the secretary of the Auckland Farmers'

Plate 14.—BLACK ORPINGTON HEADS AS PICTURED IN COOK'S WORK.

The head of the good layer.

The head of the bad layer.

Freezing Company, Mr. Long, for his powerful organisation to come to the aid of a small struggling community of primary producers, to cool store their summer surplus so that they might get the full value for their eggs in the winter months instead of being exploited by the city grocers. The principle appealed to Mr. Long, seeing his company was purely co-operative, and he arranged an interview between his chairman of directors, Mr. Ambury. Mr. Ambury received the proposal very sympathetically, but said, of course, that all the eggs would have to be tested to insure that the company would have the needed security against the advance. The engineer was consulted, and after going into the matter of modern methods of testing eggs, &c., Mr. Ambury agreed to the very liberal advance of 11d. a dozen. The writer then informed the secretary of the Auckland Egg Circle of what he had done. The secretary saw the company and made all the arrangements, and for the past two seasons the arrangement has run most smoothly, bringing great profit to the members of the circle and placing the society on a firm footing. The Auckland Egg Circle graciously acknowledged our assistance in the following resolution:—"That the 'New Zealand Farmer' be thanked for using its influence in making satisfactory arrangements with the Auckland Farmers' Freezing Company, Limited, so that this society was able to cool store its surplus eggs."

LENGTH OF COMB.

It is interesting, in view of the statements of those great foundation breeders, Cook and Wright, that length of comb in the Orpington goes with laying quality, to have the opinion of a notable Australian breeder, J. E. Bradley, on this subject. Mr. Bradley has noted in the best-laying strains of Black Orpingtons there is a period in the history of the strain when the combs tend to oversize. This can be corrected, but the comb of the laying strain is always, on the average, larger than the comb of the show-type Orpington. Observant breeders have noted that in the majority of cases the good layers had larger combs relatively than had the poor layers. Combs are secondary sex characters; they are correlated with other primary sex organs. The comb of the hen increases in size when she is about to lay, or is laying. The growth, size, brilliant colour, &c., are due to increased nutrition, through the blood supply to those parts. In the blood supply there are phosphorus compounds, and doubtless substances contributed by the organs of internal secretion, the presence of which influences the condition of the comb. The various substances become oxidised in the comb (wattles), and are then, of course, lost to the system. In the case of the dubbed bird, the circulating blood still carries the substances referred to, but they are conserved to a great extent, and serve as nutriment for the primary organs and their related parts. Dubbing is an operation which, if properly performed, causes very little pain, but certainly insures the bird against the very great pain of a comb lacerated through accident.—"New Zealand Farmers' Stock and Station Journal."

THE MUSCOVY DUCK.

By R. T. G. CAREY, Beerwah.

FROM WEANING TO MATURITY.

Duck culture has many side issues that require diligent attention; foremost is "weaning"—whether you take away the mother, or discontinue the brooder. Either will often exercise some serious effect upon the tender constitution of the ducklings, whereas the removal (oftentimes too early) of either the natural or the artificial warmth (suddenly discontinued because of climatic conditions during the night) indicate a favourable rise in temperature and occasion the belief that the period has arrived to transfer that brood into cooler quarters. But, unawares, a cold snap occurs, and the sudden chill causes a loss, not only through death, but affecting health thereafter, inasmuch as the labour entailed in rearing or raising them up to that age means a serious loss.

The prudent duckman does not take such chances after having, by careful attention, reared his ducklings to that stage when they will not need the brooder, but has the all important substitution previously prepared and ready which may be a comfortable well-sheltered house, with a deeply-grassed floor, not stuffy, but well ventilated. In such a fireless brooder young ducklings may safely be reared. The foregoing remarks are in reference to our early-hatched ducklings throughout the wintry months.

During the settled warm weather (meaning summer), the risk in weaning ducklings is less; doubtless it can safely be done, almost as early as the young are dried off, because they can depend entirely upon the warmth of their own bodies and that of their mates with beneficial results. Therefore, brooders, at such times of the seasons, are not necessarily needed. The fact is that the open pens and pure air dispel the close and foul air that would have occurred if a brooder were used.

My own experience is that a broody duck can foster 50 to 60 youngsters. What really is needed, and the most requisite, is a ''philo-attendant'' to keep them from wandering, as a delinquent youngster may leave the flock and get lost, or probably be seized by some reptile or hawk. The *wanderer,* as soon as he feels that he is astray, stands erect to the fullness of his height, and begins to peep! peep!! peep!!! Listen for the call—the ''squaw.'' Although often at a great distance from his mates he instinctively makes a bee-line-run back to his brethren. It is a wondrous sight to see the dear little fellow run—Oh! how he can go!

Culling at the weaning stage must be effectively done. The very poor and unpromising ones, or those with tears in their eyes, should be killed at once; this minimises the loss and the useless expenditure of feed and labour in trying to rear and nurse them until they reach a marketable size. Even then they are miserable ducks, which fail to realise a value that does not pay for the cost of labour, &c. Unless a duckling, at this period, is vivacious, promising, and not lacking in ''pep,'' but has some slight physical ailment or enervation arising from hereditary atavism, its immediate slaughter may be deferred, but it ought to be legbanded, so that when grown it can instantly be identified as unfit for a breeder, but suitable for the table.

Breeders, which are invariably chosen at this period or at some other subsequent date, are separated and treated by judicious feeding up to maturity, but on no account must force feeding be done. Breeders, wherever possible, should be range-fed, as the exercise maintains constitutional vigour and health and prevents the young breeders from gaining or running into fat, or becoming lazy or mopish. The objective for a good breeder is to induce a strong frame of bony structure, which afterwards can be meat-filled, and just as soon as it attains full development may be mated up. Naturally of high fecundity, breeders seldom have infertile eggs. The probability of the number of hatches that a Muscovy duck may raise during any one year could be given with some accuracy, but is dependent on good or bad management. However, that may be; by a very careful adherence to details and good administration, she can raise 50 or 60 ducklings in a season.

Constructively the Muscovy ducks are not heavy egg producers; therefore they are not bred for egg production, but rather for meat purposes. It is the raising and rearing of the young stock and the correct feeding, also the marketable age, that the raiser must fully study. There are times when market prices are fabulous, whilst there are other times when the figures are ridiculously low. In a season, or at times of the year when full-grown ducks are in demand, also when a young juicy duckling of half the weight of a full-grown one is wanted, it never pays to market the birds when only partly fatted or poor-conditioned. Always aim at getting the greatest weight that can be attained. Say in a flock of twenty-five, the pen average weight per bird must correspond with age. Watch carefully when the condition is just accomplished or on the point of acquiring its fulness, then market immediately. The buyer will snap the opportunity of purchasing the prime article, and the business pays well when the seller, purchaser, and producer are all satisfied.

CAMPINES.

Little, if anything, is to-day heard of the breed of poultry known as Campines, yet, only a few years ago, this breed was all the rage in England, when it was a very old-established breed in Belgium. At that time a special correspondent of the ''Adelaide Observer'' wrote as follows concerning this breed:—

Campines.—Mr. E. Cobb, F.Z.S., says:—''Whether the Campine is bred from the pencilled Hamburgh or the Hamburgh from the Campine is a point as yet unsettled, but I am strongly of opinion that the Hamburgh derives its origin from the Campine. I could quote several reasons in support of this argument, but will content myself with two or three. Firstly, the silver Campine never throws a rose comb, but every breeder of silver pencilled Hamburghs knows that he gets many single-combed Hamburghs. Secondly, the silver Campine is a much larger bird than the silver pencilled Hamburgh (quite a few hens weighing 6 lb. and over each), and this can easily be accounted for by the amount of in-breeding that has been going on for many years in order to perfect the grand pencilling of a present-day show specimen of the pencilled Hamburgh. Thirdly, the silver Campine has a dark, nearly black eye, and the silver pencilled Hamburgh a red eye. At first sight there may not appear anything in this to uphold the argument that the silver Campine is the parent of the silver pencilled Hamburgh, but I think I can show that there is, and a strong one too. Among the silver Campines there are some that have more or less a light eye, and I am perfectly certain that, in a very short while, it would be most easy to produce red-eyed Campines by simply selecting those that show a tendency to deviate from the dark eye. Old Hamburgh breeders probably thought—as they

would now—that the colour of the eye was a secondary consideration compared to the pencilling, and, therefore, mating solely for pencilling, they probably bred from many light-eyed specimens, and inbred such, and, in consequence, eventually produced the red eye; or it might even be that they endeavoured to produce the red eye. But in any case the red eye could easily be produced from the Campine, though, in my opinion, it would be almost an impossibility to establish the black eye from the silver pencilled Hamburgh.''

The silver Campine is kept in Holland almost exclusively for its grand laying qualities and for the rapidity of its growth, enabling the farmers to sell ''spring chickens'' at a much earlier date than most other breeds. The majority of what few fanciers there are in Belgium appear to scour the farmyards in the country a short time previous to a show, and to pick up the best specimens, the consequence being that there has been no serious attempt to scientifically breed the Campine to standard, and, although it was necessary to go to Belgium for the original stock, it is becoming more apparent every day, especially as the adopted English standard differs considerably from the Belgian, that it will be useless to do so in the future.

In Belgium the Campine is called by two names—viz., Campine and Braekel—but to all intents and purposes they are one and the same breed, and English fanciers designate them under the same heading, Campines. The fact is there are two well-known districts in which the breed has for many years been produced. In one, owing probably to mismanagement, though they put it down to the soil, they are bred far smaller than in the other, but the standard is the same, and I think the whole matter speaks for itself when I quote the words of a well-known Belgium breeder, who informed me that—''We don't know when they are chickens whether they will be Braekels or Campines; it all depends on whether they grow big or remain little.'' To any impartial critic there can be no question as to the utility powers of a Campine as a layer. Given a good strain, they lay what may be fairly called a large market size egg, and an abundance of them both winter and summer. They are very hardy, small eaters, and if given their liberty will find more than half the food they require. They are non-sitters (there are always a few exceptions to every non-sitting breed), and, like all non-sitters, lay a white-shelled egg, but I have always found that two white-shelled eggs fetch more than one brown one.

As an exhibition fowl they are most pretty, and have taken a strong hold on the British fancier. All the principal shows and many others in England are now giving classes for Campines, which are always well filled, and there is no doubt that silver Campines are one of the most profitable breeds in which to invest, not only for their laying qualities, but as one of the coming most popular exhibition varieties. It is to be noted that there are three varieties of Campines—viz., silvers, golds, and whites; but the silvers are the only ones that are finding genuine favour in England. The following is a copy of the revised standard as issued by the English Campine Club:—

THE CAMPINE STANDARD.

General Characteristics.

Beak—Short.

Eyes—Bright and prominent.

Comb—Single, medium, with even serrations, coming well back, free from excrescences, upright in cocks, falling over in hens.

Face—Smooth.

Earlobes—Medium, inclined to almond shape, free from wrinkles.

Wattles—Longish, fine in texture, in proportion to comb.

Neck—Medium length, nicely arched, well furnished with hackle.

Breast—Very full, round, carried well forward.

Back—Rather long.

Body—Broad, tapering to tail, close and compact.

Wings—Large, neatly tucked up.

Tail—A good length, sickles and secondaries broad and plentiful, carried well out from the body.

Legs and feet—Medium length, toes slender and well spread.

Size—The larger the better.

Carriage—Very alert and graceful.

Colour (Silver Cocks and Hens).

Beak—Horn.

Eye—Iris dark brown, pupil black.

Comb, face, and wattles—Bright red.

Earlobes—White.

Legs and feet—Leaden blue; toenails horn.

Neckhackle—Pure white.

Body, wings, and tail—Rich, beetle-green, mackerel markings or pencillings evenly distributed on a white ground, forming as near as possible ''rings'' around the body.

It is to be noted there are no specimens in existence conforming to this standard in every respect; but these particulars represent an "ideal" bird for breeders to strive to produce.

Scale of Points (for guidance of Judges).

Comb	5
Eye	5
Earlobe	5
Legs	5
Hackle	10
Condition	10
Beetle-green sheen	15
Tail	15
Distinction and evenness of markings	30
	100

Disqualifications.

Legs other than leaden-hue.
White in face.
Red eyes.
These markings to be broad and not fine like a Hamburgh's pencillings.

Standard for gold Campines the same as silver, merely substituting the word "gold" in "white" as above. The gold ground colour to be as rich as possible and not a washed-out yellow.

Apiculture.

THE AUTUMN AND WINTER MANAGEMENT OF BEES.

Mr. W. A. Goodacre, Senior Apiary Inspector, New South Wales, writes on the above subject, in the "New South Wales Agricultural Gazette" (2nd April) as follows:—

Greater attention should be given by the majority of apiarists in preparing their colonies for the hardships of winter, and to enable them to come into spring with a minimum of loss and a maximum of population. Many apiarists state that they have had practically no loss, in spite of the lack of preparation; but it is found in the majority of such cases that a loss has occurred in the population of the colony. Bees require less attention than most things on the farm, but what is required must be given. The practical man will prepare his colonies for winter during summer and autumn; for in this industry it is necessary to prepare for the future, and thereby save many colonies that would otherwise perish through lack of foresight and consideration on the part of the owner.

AUTUMN MANAGEMENT.

In the autumn the colonies should be prepared for winter, and first of all it will be necessary to have a considerable number of young bees capable of the prolonged work of heat generation and for the purpose of starting extensive brood-raising in the spring. To obtain the young bees we naturally look to the queen, and favourable brood combs in the brood nest. This is the time to replace any failing queen bee, also any queen completing her third season. A failing or unsatisfactory queen can be distinguished by notice and comparison in the brood nest; for instance, a sprinkling of drone larvæ will often be found in the worker cells (the top of these cells when capped will be bulged to the shape of a .22 rifle bullet); the queen in this case will have a worn-out appearance. In other cases the brood will not be packed, as will be noticed where a vigorous queen is present. The progress of the colony should be noted for some time, and the failing or old queens should not be allowed to remain long enough to decrease the population.

At all times care should be taken to have selected combs in the brood nests. If combs containing many drone cells are noticed during the autumn they should be removed to the outer edge of the brood nest, and when an opportunity arises, such as a honey-flow combined with favourable weather, such combs can be removed and used for honey storage only; they should be replaced with full sheets of comb foundation in the brood nest.

During extracting in the autumn many combs containing emerging brood will be noticed in the supers of populous colonies; many of these can be used to strengthen the weaker colonies. Use judgment in this and do not retard the progress of the populous colonies to any extent; it should only be a matter of taking one frame containing a fair patch of emerging brood from each colony. There are apiarists who try to assist weak colonies by giving unsealed brood; this is a great mistake, as the colony generally has as much as can be cared for, and this extra strain placed on them will result in a good deal of neglected and chilled brood.

Care must be taken to have ample stores available for winter months; generally one full super and what is naturally contained in the brood nest will be sufficient and will give a good start for extensive brood-raising in the spring. If ample stores are not left in the hive, it will induce the bees to become economical and come into spring with less vigour.

All surplus supers should be taken off, and the colony left with as much space as can accommodate the bees comfortably; when a colony is left with too much space and the hive not adjusted to prevent a draught, the bees eat more than should be necessary in order to keep up the temperature; this will often cause dysentery and heavy losses through "spring-dwindling" later.

Coming on winter many apiarists contract the entrances to the extent of only allowing a few bees to pass out at one time; this is a mistake, and may result in having mouldy combs in the spring. Bees need a certain amount of fresh air; a $\frac{3}{8}$-inch entrance, full width, will not be too much for the average colony. All other openings should be plugged, so as to prevent a draught through the cluster of bees.

Insulating material, such as ruberoid and good sheets of paper placed over the frames just before the winter, is advisable; if paper is used it should be removed early in the spring as the bees will tear it to pieces. The cover should be sound, and an extra covering of good sound bark is advisable; this bark when properly stripped and cleaned does not spoil the appearance of the apiary by any means. Colonies of less than four good frames of bees should be united; this can be done by placing a sound sheet of newspaper between them. This will prevent the bees immediately attacking each other, and by the time they nip their way through the paper, and unite gradually, they become reconciled. It is best to unite colonies after the bees have finished the day's work.

Colonies which cover four or five frames can often be wintered successfully by placing a follower or division board and pack paper in the space between the follower and the wall of the hive, having a good sheet of brown paper over the frames; such a colony should have ample stores. Colonies found to have insufficient stores for winter can be given frames of honey from other colonies, or fed with sugar and water made up as outlined later.

WINTER WORK FOR THE APIARIST.

There are localities in New South Wales where bees gather surplus sufficient to warrant the apiarist using the extractor during the winter months, but this only occurs in warm localities and is not general. In the majority of places the bees should be left severely alone until activity is resumed in the spring. There will be a considerable amount of work during winter, such as preparing hives, tins, &c. As many apiarists use benzine tins as a container this will be the time to obtain a stock; they should be washed and the tops soldered ready for use.

Great care is necessary in washing the tins. This is a good method:—Take 8 gallons of water, 1 tablespoonful of carbonate of soda, and a small piece of soap, bring to boiling point and stir well. About one quart should be poured into each tin, then give a good shake to get the solution into all corners. If no washing machine is available this can be done by hand if the hands are protected, for the tin becomes very hot. The solution can then be poured into other tins, giving double quantity. The tins should be immediately rinsed with cold water in the same manner, and then placed in the sun, the opening of tin at the lowest if possible; the tins can be dried out later, and still kept in the sun. This one treatment will suffice generally, but further treatment is at times necessary; there should be no odour of benzine in tins to be used as honey containers.

Frames can be made up and wired, but it is not advisable to place comb foundation in the winter.

THE ARTIFICIAL FEEDING OF BEES.

There are indications at present that apiarists in some localities will need to resort to artificial feeding of their bees, in order to supply the necessary winter stores; also in other cases where there may be a lack of stores. It is therefore advisable to consider the different methods of feeding, the class of food suitable for bees, and the effect according to existing conditions.

CLASS OF FEED.

This may consist of (1) honey, secured from an apiary known to be free from disease, or (2) syrup, made from good cane-sugar and water.

To make the syrup use one part of sugar to one part of water by volume; boil the water, then add the sugar a little at a time, keeping well stirred, until all the sugar is dissolved. If this class of food is to be given late in the autumn in cool climates, add two parts of sugar to one of water. Honey is not necessary in this syrup, but 1 pint to 4 gallons will be an improvement.

SERVICEABLE FEEDERS.

If the feeders are to be purchased from the factory, the "division board feeder" is recommended for supplying winter stores, and the "simplicity" for supplying stimulating feed. If expense is a consideration, use any sound container that will fit in the super or hive, and allow access by the bees; if tins are used it will be necessary to place pieces of board to prevent the bees from being drowned.

METHOD OF PLACING FEEDERS.

Place an empty super on the hive, and a mat over the frames, allowing some space at each end for the bees to pass. Another method is to remove a few frames to allow of sufficient space for the feeder; an empty super and mat will be unnecessary in this case.

THE USE OF STIMULATING FEED.

This class of feeding will induce brood raising, and should only be given under favourable conditions, such as when the weather is mild, and not likely to change for some time, and when at least a small quantity of pollen is being gathered (no nectar). It should not be given in the month of April unless in a warm climate.

Give about 1 lb. of the honey or syrup daily to the average colony; if candied honey is used, give about 2 lb. every third day. If the conditions are favourable, the apiarist will be well repaid for his trouble by having a large number of young bees ready for the hardships of winter.

FEEDING FOR WINTER STORES.

Feeding for winter stores should take place late in the autumn, when it is considered that there is no chance of a further flow of honey. The food should be given in large quantities, making a total of not less than 25 lb. in not more than three days to the average colony. In case the colony has insufficient stores, the quantity can be regulated to increase the total weight to about 25 lb.

LACK OF STORES DURING THE SEASON.

Feeding on account of lack of stores can be done in the same manner as for winter, only that a smaller quantity would be necessary; for instance, if the honey flow is expected in about six weeks, then about 10 lb. would be sufficient. It is not advisable to give more than 10 lb. at any time; the bees can be fed again if conditions warrant such a course.

RHODES GRASS FOR SHEEP.

Mr. W. G. Brown, Instructor in Sheep and Wool, Department of Agriculture and Stock, whose articles on the raising of sheep on our coastlands, published from time to time in this Journal, were largely instrumental in inducing several farmers to make trial of small flocks on their holdings on coast lands resulting in proving that by judicious feeding and management the business is a profitable one, has just reported to the Department the result of his inspection of Mr. F. W. Lee's property, at the Baking Board Siding, on the Western Line. "Mr. Lee," he writes, "has 400 acres of Rhodes grass. This area has been carved out of thick prickly-pear and brigalow scrub, and is now quite clear of pear. To provide for a bad season, such as he has experienced for the past nine months, he dug a pit and stowed away about 100 tons of Rhodes grass, which in the main part made excellent ensilage. This ensilage has stood to him remarkably well, for he has been feeding 1,600 sheep on it and the scanty growth of grass left with very little loss. Of course he has overdone the business in the matter of stocking.

"He has now about 30 tons of ensilage left, and it is instructive to see the sheep, as soon as the ensilage is being cut out of the pit, running from all directions to get it.

"I call your particular attention, sir, to this case, as showing the possibilities ahead of sheep farmers who provide fodder for a possible bad season. All this man's neighbours have had little or no stock running on their holdings for months. He has proved, incidentally, that Rhodes grass is excellent sheep feed. I may mention that the total cost of the ensilage to Mr. Lee was £35 outside of his own labour. His sheep, although poor in condition, are healthy and strong, and he has done very well in the past, when the seasons were good. His wool last year sold really well, up to 19½d. per lb. being realised. A few hundred selectors of this stamp would make a big difference in Queensland, for their example would show how remunerative the sheep business is, if only provision were made for a very probable bad season. I may say that several other selectors are following his example, and will store fodder when rain comes."

Dairying.

WHEY FOR CALF-REARING.

There is at the present time a great need for the extension of cheesemaking, which shows every prospect of being profitable, and the Board of Agriculture have endeavoured during the past year or two to demonstrate in a number of centres the possibilities of co-operative cheesemaking for farmers, and have arranged for instruction through travelling cheese schools. The chief objection of farmers in stock-raising districts to taking up cheesemaking is that they say they must have either whole milk or separated milk for their calves. The development of cheesemaking is, therefore, held up until farmers can find a substitute for their calves. The substitute is at hand—in the cheeseroom—in the shape of whey. Most farmers may be unaware how they can use it with advantage for calf-rearing. About a year ago the Board arranged for trials to be made, and it has been found that by using a mixture of concentrated and highly digestible foods the difference in composition between milk and whey can be made good. Farmers are now able to convert their milk into cheese without fearing that their calves will suffer—"Live Stock Journal."

LINSEED FOR CALVES.

The "South African Farmers' Advocate" says that in rearing young calves there is nothing to compare with the judicious use of linseed.

A GREAT FRIESIAN RECORD.

The rapid rate at which a small start of pure-bred Friesian cattle grows into money is illustrated by the herd belonging to the University of Missouri.

In 1902, the expert who had recently taken charge of the Dairy Department of the Agricultural College, was allowed £120 to start a herd of Friesians. This small sum, of course, went farther than it would now. Four pure-bred heifers were purchased. One of these, after having a bull calf, proved to be unsatisfactory, and was sold with her calf. Not a single female has been purchased since that time, and all the herd is descended from the three cows. Up to the present there has been sold surplus stock to the amount of £2,394 cash, and there are on hand forty-three females, the inventory value of which is £3,230.

In the herd descended from these cows have been developed six cows that have produced over 20,000 lb. of milk in a year, four of them having butter records above 800 lb., one of them holding the State record for butter for Missouri for several years. One has averaged over 14,000 lb. of milk a year for nine years. Another has produced over 144,000 lb. of milk so far, and is still producing over 55 lb. a day at the age of thirteen years.—Perth "Farmer."

RELEASING A MOTOR-CAR.

The "South African Farmers' Advocate" shows how a motor-car sunk in a sandbed may easily be released, and records how a motor-car sank down deeply in a sandy patch, and the lady driver could not get it out. In the country many drivers carry a small coil of wire for emergencies of this kind. A tree or fence post, or even a stout post driven down into the ground, will serve as an anchor. Fasten the wire securely to this, then run it under the protruding hub or the rear wheel, and fasten it to one of the spokes. If the gear is reversed, the car will back itself out.

Tropical Industries.

THE CULTIVATION OF SUGAR-CANE IN QUEENSLAND.

By HARRY T. EASTERBY, General Superintendent, Bureau of Sugar Experiment Stations.

PART IV.

CANE CULTIVATION ON OLD LANDS.

Having dealt with the growing of cane upon new scrub lands we may now proceed to the cultivation of cane upon older lands—viz., lands that are cleared and under the plough. By far the greater part of the cane lands in Queensland come under this category, especially in the older areas which have been growing cane for many years. In the following districts either the whole or the greater part of the canegrowing lands are under the plough;—Logan, Maryborough, Isis, Bundaberg, Mackay, Proserpine, Lower Burdekin, Herbert River, Mulgrave, and Mossman.

Commencing with old land, then, that has grown cane before, the first thing to be done is to plough out the stools of the previous crops. A disc plough, either double or single, is generally used for this purpose, and the discs should be particularly sharp so as to cut up the stools as much as possible. A few farmers make a practice of carting away the old stools, and if the time and labour can be afforded it is often wise to do this, as it gets rid of any disease and borer. It is, however, recognised that there are many difficulties in the way of carrying this out, and if it is not practicable the stools should be cut up so as to secure their quicker disintegration.

LIMING.

Owing to the long-continued growth of cane upon the same land, and also, in some instances, to the continued use of acid fertilisers such as sulphate of ammonia and superphosphate, the bulk of our older cane soils in Queensland have become acid in reaction. This has been exhibited time after time in analyses of soils made by the Agricultural Chemist and by the Sugar Bureau. After ploughing out the stools it is, therefore, wise in most instances to apply lime, and it also has the advantage of increasing the purity of the juice of the succeeding cane crops. There are many other benefits to be obtained from a dressing of lime which may be summarised as follows:—

1. It acts on dormant mineral matter and renders available phosphoric acid and potash which would otherwise remain inert.
2. Acts on organic matter and converts part into nitrogen compounds available for the crop.
3. Enables the plant to make the greatest use of artificial fertilisers.
4. With moisture and warmth it favours the maintenance of abundant bacterial life, especially those forms which aid in nitrification.

5. It develops the activity of root bacteria in leguminous crops. In soils with an acid reaction, the fixation of nitrogen from the air is frequently at a standstill.
6. Improves the mechanical condition of the soil. Stiff clay soils are rendered more friable, less adhesive, and porosity is increased, so that its cultivation can be more easily undertaken.

Lime is usually applied to the soil in the following forms:—

(*a*) Burnt lime or lime oxide.

(*b*) Air slaked lime—*i.e.* burnt lime that has been allowed to gradually slake in the air and which ultimately becomes lime carbonate.

(*c*) Water-slaked lime (lime hydrate).

(*d*) Pulverised limestone (lime carbonate).

Burnt lime is the most valuable form for sweetening soils, and producing alkalinity, especially on our Northern canefields, where the rainfall is great and the humus plentiful. It is, however, hard to obtain in a fine condition, and is very disagreeable to handle. By air-slaking, however, it soon crumbles into a fine powder which gradually turns into lime carbonate—a milder form of lime. This can be easily applied, and is recommended where a quick action is desired.

Ground or pulverised limestone is also very useful, but its action is comparatively slower.

THE RELATIVE VALUE OF DIFFERENT FORMS OF LIME.

Fifty-six pounds of fresh burnt lime contain the same amount of lime as 100 lb. of carbonate of lime (ground or pulverised limestone); 100 lb. of old air-slaked lime; 74 lb. of water-slaked lime; 100 tons of burnt lime have the equivalent value of 178½ tons of pulverised limestone or carbonate of lime.

The pulverised limestone is much more agreeable to handle than burnt lime, even when the latter is air-slaked, but in considering cost it has to be remembered that in value 1 ton of burnt lime is equal to approximately 1¾ tons of ground limestone, and will slake to that amount. In considering its purchase, therefore, the question of freight and price must be considered, so that it may be determined if it can be used economically. The very high price of lime in many of our sugar districts renders its application a costly business. This is largely due to the freights charged, and when it is considered how largely dependent the Northern steamship traffic is on the sugar industry, one would think that it would pay the shipping companies to carry such articles as lime and fertilisers at nominal rates in view of the increased business that would result from the extra output of sugar, the greater prosperity of sugar farmers and others (which would enable them to more frequently travel), and the carriage of a larger number of labourers to deal with enhanced crops.

The Railway Department, at the request of the Bureau of Sugar Experiment Stations, now carries pulverised limestone at ½d. per mile when the distance exceeds 25 miles.

Lime should be spread broadcast with shovels, selecting the early morning for the purpose when there is little or no wind, and it should be immediately ploughed under. This ploughing should be shallow, as the lime will naturally work through the soil. It is sometimes preferred to harrow the lime in, reserving the ploughing to a few weeks later.

Machines are made to distribute lime, and an implement of this nature can be very well used with pulverised limestone. Lime can also be spread from a dray having a simple arrangement of boards and hessian at the back, but a proper lime-spreading machine is the most satisfactory.

Sulphate of lime, or gypsum, is not recommended for cane soils.

DEEP PLOUGHING AND SUBSOILING.

The use of the tractor for ploughing purposes is now coming into extensive use, in North Queensland especially, and in many places good and inexpensive work is being done by its means. It, however, is of limited use on small areas, where horses are to be preferred. Nearly all the tractors in use pull from two to four discs and burn crude kerosene. The accompanying photograph shows one of these tractors at work.

Land for canegrowing should be cross-ploughed deeply, not less than four times, and well worked up by harrowing and, if necessary, rolling, till it attains a fine state of tilth for planting. Every energy should be bent towards securing the land in perfect heart, remembering that tilth should be secured prior to planting, not after it. With a good deep soil bed in fine order, the best results can be hoped for. In considering this phase of the question, the matter of subsoiling naturally crops up.

The experience at the Mackay Sugar Experiment Station, at Hawaii, and of many Queensland farmers who have tried it, is that subsoiling pays handsomely. The great drawback, under present conditions, is the time occupied in doing the work. With one team of four horses only half the area usually ploughed can be accomplished. The method of subsoiling recommended is to open up a furrow with the swing plough to the depth of the soil usually ploughed, and then to use a subsoiler, which will loosen or stir the soil to the depth of another 6 inches below this, but which will not bring any of this lower soil to the top. At the Station, the depth ploughed varies from 12 to 14 inches and the depth of the subsoil stirring from 6 to 8 inches, thus forming a mass of fine, loose soil for the needs of the crop, while it is also a great help in the conservation of soil moisture. That the roots of the cane will take advantage of deep and subsoil cultivation is shown by the fact that roots have been found at 4 feet deep in loose soils.

The benefit of subsoiling plant crops of cane at Mackay has been most marked. As much as 20 tons more cane per acre has been obtained from land subsoiled than from similar land cultivated in the ordinary way. Further reference to this matter will be made in connection with the subject of ratooning.

NECESSITY OF RESTORING HUMUS TO SOILS.

One of the best methods in preparing land for cane crops is the growth of a green manure crop and its subsequent ploughing under. This is not only a form of rotation which in itself is highly beneficial, but it is a means of restoring humus to our old cane lands, which is a prime essential in the making of a fertile soil. Humus benefits the soil physically—

1. By augmenting its water-holding capacity.
2. By increasing its warmth.
3. By bettering its texture and being a controlling factor in the determination of fine earth.

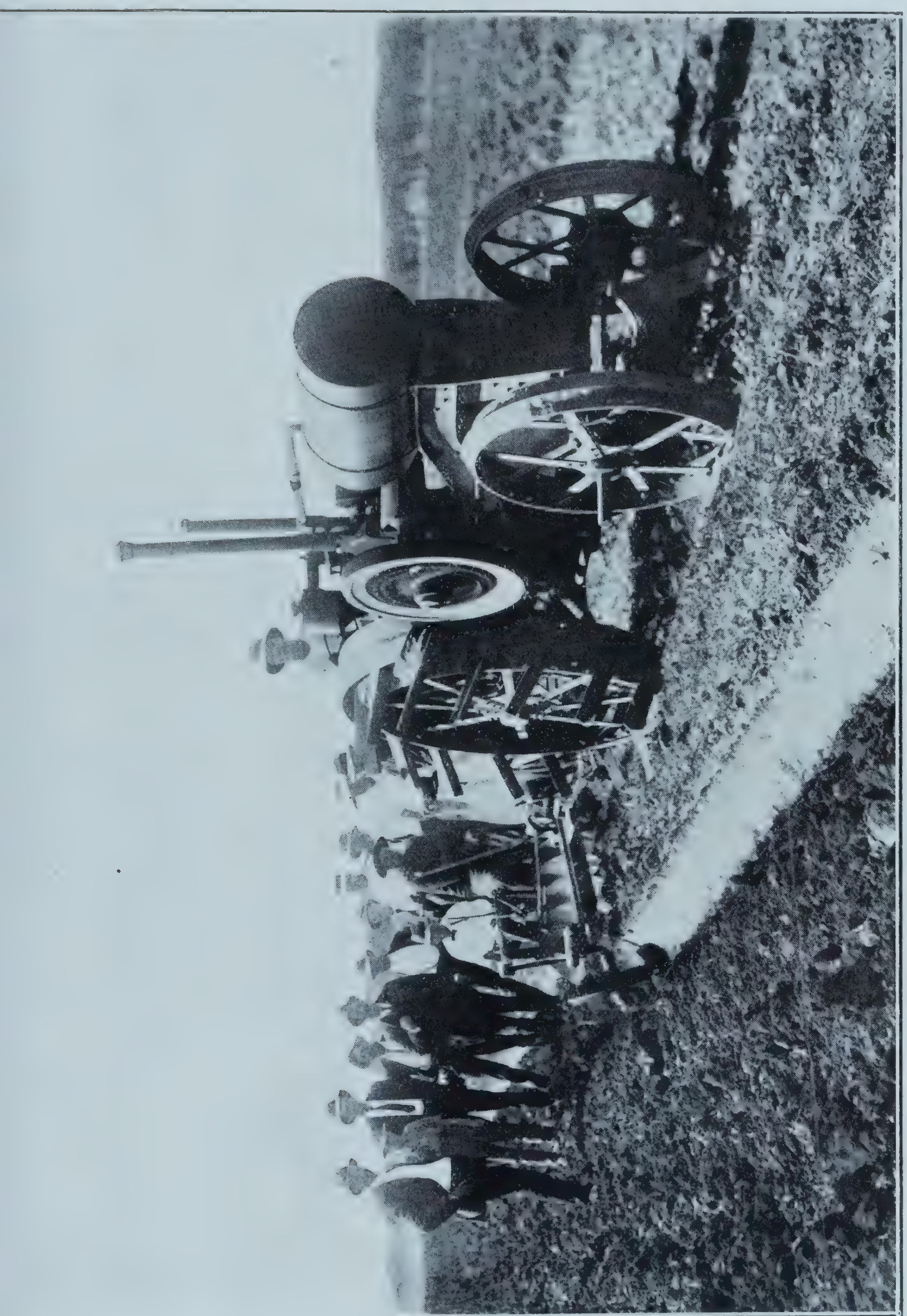


Plate 15.

Humus in the soil is lowered by:—

1. The continued growth of crops.
2. Bare fallowing.
3. The continued use of commercial fertilisers.

The best possible crops to grow for green manuring purposes are the legumes, such as cowpea, Mauritius bean, velvet and soya beans, lupins, vetches, &c., and it is strongly recommended that the next device for restoring fertility to the soil, after the liming and subsoiling has taken place, should be the growth of a leguminous crop of some kind for the purpose of ploughing under. In addition to supplying the needed humus, the soil nitrogen supply can be greatly increased by the capture of nitrogen from the air and its fixation in nodules upon the roots of legumes. These crops also supply phosphoric acid, potash, and lime indirectly. Other advantages may be summarised as under—

1. During growth the ground is shaded and moisture is conserved.
2. Erosion of fine earth is prevented during heavy rains.
3. Weed-killing is promoted.
4. The deep tap roots of leguminous plants bring available plant-food from the subsoil to the surface soils.
5. The interposition of a crop, other than cane, that will act in minimising fungoid diseases and insect attacks. If the habitat of parasites attacking the cane is removed for a time, it must result in their dying out or disappearance.
6. Crop rotation.

Nitrogen is the soil element that becomes the most quickly exhausted, as it is also the element that is the most expensive to purchase. The nodules upon the roots of leguminous crops, under favourable conditions, are the abode of countless thousands of bacteria, being themselves minute living plants which have the power of seizing nitrogen from the air. In this way a leguminous crop may get from the atmosphere from 100 to 200 lb. of nitrogen per acre. The best time to plough-in green crops is at the time the seed in the pods is in a milky condition. Some difficulty may be experienced in ploughing under a heavy crop of green fertiliser. By first rolling, then disc-harrowing it, and finally using a plough with a large disc, it becomes an easy matter to successfully cover the crop.

Generally speaking, it takes from six to eight weeks for the crop to rot down. When this has taken place, if the time is convenient, the ground can be got ready for the succeeding cane crop.

DRAINAGE.

If the ground is inclined to become water-logged, or if subject to heavy tropical rains, it would be wise to drain the area to be put under cane. Tile draining is the best form to adopt, but this is usually costly, and good results may frequently be obtained from surface drainage, such as laying the land in beds, with a water furrow between so many rows of cane. These can be led to drains along the headlands if the lay of the land is suitable.

(To be continued.)

TROPICAL AUSTRALIA.

It is not often that we see articles appreciative of the Queensland sugar industry in the Southern Press, but the following by Mr. J. S. Hoskins has been published by the Sydney ''Sunday Times,'' and is worth repeating:—

Mr. Hoskins here gives a picturesque account of a recent tour among the canefields of Northern Queensland, and tells how the great forest lands are being made to yield up some of their vast stores of latent wealth. The work, as he has seen it, is long and hard, but the reward is big, and the successful settler can live in comfort.

''I pushed my way overland to the canefields of North Queensland. I wished to verify the statements so oft repeated of the wonderful potentialities of the country between Ingham and Cairns. I wished to see with my own eyes the beauties, the luxuriance, the wealth. At the first town I visited I arranged to be called by a canecutter on his way to work, and it was still dark when a voice beside me called, 'Come on, stranger, we are getting away now.'

''We had some bread and tea, and strolled off to a 15-acre patch of cane. There was a gang of twelve very soon on the ground. They were dressed simply enough—in sleeveless shirts open at the front, light trousers, and broad-brimmed hats. Some wore boots and socks, some boots without socks, and some no boots at all. They were mostly Italians, but among the dozen men were representatives of five different nationalities.

''When work began there was barely sufficient light to guide the long, broad knives with that unerring swish upon the cane. There had been the usual heavy tropical dew, and the sheath-like leaves poured a stream of moisture down the backs of the perspiring workmen. But they appeared not to be discomfited; they laughed and joked over their work, and yet kept busy hewing into the long juicy stalks.

''HOW THE CANE IS CUT.

''With one stroke of the knife the cane is severed as closely as possible to the ground; a few rapid strokes, and the leaves and top are off, leaving just the long, bare stalks. Another quick movement, and it is thrown back on to a heap ready for loading. So the work goes on till breakfast time, when a halt is called. By this time the sun is already climbing up; the moisture has risen in a great white mist, and everything is dry except the sweat-laden clothing of the workers.

''When sufficient cane is cut the knives are laid aside, and the more strenuous work of loading is begun. The Colonial Sugar Refining Company, which has tremendous interests all along the sugar areas, runs light lines right into the fields. Along the roads contiguous to the cane farms permanent tramlines are laid, and at convenient places are made junctions to link up with the various crops on either side. These portable lines, which facilitate loading to a wonderful degree, are in small sections, easily handled and quickly laid. A string of forty or fifty trucks, according to the needs of the farmer, is pulled out to the junction from the company's sheds and shunted off. The trucks are taken from there by a team of horses and run over the previously laid temporary line right along the little heaped-up rows of cut cane.

''HEAVY WORK LOADING.

''I had a try at loading cane myself, and found it mighty hard work. The cane, which was anything up to 15 ft. in length and as heavy as lead, had a habit of swinging up under my nose and spreading out in all directions when I attempted to put a bundle on my shoulder. I found that four lengths of cane were as much as I could conveniently carry, while others were swinging along seemingly easily enough with three times that amount. All the men in this gang were on contract work, and consequently they worked at a tremendous pace. They were averaging upwards of £2 per day, working long hours and keeping apparently healthy.

''Of course, the great majority of these workmen have a spell of from two to four or even five hours in the hottest part of the day. They consider that they do better work, more work, and feel healthier by starting at daylight in the morning, spelling through the middle of the day, and then working till dark.

"ITALIANS JOYOUS, BUT THRIFTY.

"In all these cane districts which I visited there were great numbers of Italians. At night, after the long day's work is through, they seek pleasure in the wineshops and public houses. They sing the songs of old Italy to the accompaniment of scratchy violins, and phonographs are heard in almost every house. Dozens of swarthy faces are seen behind the hotel bars. There is a clink of glasses, a shout in Italian, a chorus song, and some conversation in broken English to some Australian workers, who, too, join in the festivities. In the little rooms off the bar are men of several nationalities, grouped around a table playing cards, and arguing and winning and losing. There is a ceaseless click, click of billiard balls right up to the hour of closing. It is a gay life when the cane season is in full swing, for money is plentiful, and the North is kind.

"But for all his pleasures the Italian is a thrifty fellow, and he knows good land when he sees it. The great majority of these men have little desire to return to their homes across the water. Rather, they induce their relatives and friends to join them in this great, free country. They club together in twos and threes and half-dozens, buy up land, work it all they know, save up and buy more land, until to-day by far the greatest proportion of land is owned by Southern Europeans.

"POSSIBILITIES FOR REPATRIATION.

"I understand that a lot of this country is being opened up for repatriation purposes, and I am glad to hear it. For this is wonderfully rich country, and men with any of the elements of success in them cannot help but win out in the sugar areas. I stayed with and talked to many selectors, some just starting, and some of years' standing and successful. The story is always the same. It is one of perseverance and pluck against all odds.

"A selector is fortunate in securing a piece of land. He goes out to see it. For a moment, as he looks at the great trees standing so closely together, and rests his eye upon the tangled undergrowth, he doubts his strength. He wonders if he can ever convert that primitive forest into cultivation. But his doubts are dispelled by deep desire and decision. He is an Australian, and the pioneering blood courses freely through his veins. He sees all around him prosperity, and knows himself poor. He sees on one side happy homes, commodious dwellings, fields of pasture, and waving cane, flower gardens, lawns, and vegetable plots. On the other side, standing forest, dark and impenetrable. That's his side.

"THE GREAT UNDERTAKING.

"But all the country was once like that, and with that knowledge he takes heart. As he stands there in silent meditation he creates a mental picture of the home he is going to build right in that forest. Next morning an axe is heard ringing on the trees of the new selection, and the realisation of the mental picture has begun. He sets to with a will, and soon before his persistent efforts a small patch is cleared. The valuable trees are sent to a sawmill and converted into hard cash. The scrub is burned off, and, excepting for the great stumps of the trees, the first patch is cleared. The cane is planted between the stumps and nourished by the never-failing tropical rains soon pokes its head up into the warm sunlight, and grows to maturity. The first season's crop is cut and sold, and the goal seems now within reach. More is cleared; more cane is scrub planted; the tent gives place to the humpy; the humpy gives place to the home of the settler's dreams.

"In the first years the cane was planted right up to the door of the house; but now there is a large plot set aside for flowers and fruit and vegetables. And what varieties are grown in these districts! Bananas and potatoes, oranges, lemons, tomatoes, cabbages, pineapples—they all grow in abundance. All that grows in the tropics and most Southern vegetables, &c., thrive exceedingly here. It is a truly wonderful belt of country. It is no wonder that the steady cane farmer is doing so well, and these settlements are growing and thriving. A few years of work, and men who have started off scratch in absolutely virgin country, have won out and made beautiful homes.

"Tropical Australia beckons to her stalwart sons to come and seek their fortunes. The North is lavish in her kindnesses to those who are kind to themselves, to those who will recognise that there is no substitute for success but work, to those who can smile alike at hardship and prosperity, and, having created an ideal, dare to strive on to its fulfilment."—"Sunday Times."

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

No. 15.

ON TWO SPECIES OF LABIATÆ NATURALISED IN NORTHERN QUEENSLAND.

(*a*) *Hyptis suaveolens*, Poit.*

Description.—A coarse strong-scented herb, 2-6 ft. high. Stems and leaves hairy. Leaves 1-3 in. long, petiolate (stalked) broadly ovate, edges irregularly toothed. Flowers blue, in false whorls in the axils of the leaves; sometimes in the upper part of the plant forming narrow panicles. Fruiting calyx, 3-4 lines long, strongly 10-ribbed, each alternate rib produced into a subulate tooth.

Distribution.—A native of Tropical America; now a widely-spread weed over the tropics generally. Has been received as a naturalised weed from Thursday Island (E. Cowley), Cooktown (G. Tucker), and Townsville (Rev. N. Michael). It is also very abundant about Port Moresby, Papua.

Common Names.—I know of no English name applied to it in Australia or elsewhere. Various native names are given to it in different parts of the world, but the botanical one is short and euphonious enough for popular use.

(*b*) *Leucas zeylanica*, R.Br.

Description.—An erect coarse annual herb, with quadrangular hispid-hairy branches. Leaves 1-3 in. long, narrow-lanceolate, edges rather distantly toothed. Flowers white, crowded, forming terminal heads with numerous linear bristle-like bracts. Calyx funnel-shaped, mouth oblique. Nutlets brown and shining.

Distribution.—A native of Tropical Asia; has become naturalised about Cairns (C. T. White), and about the Mulgrave River (Rev. N. Michael).

Common Names.—The same remarks apply here as to the previous plant.

Eradication.—So far, these plants have not manifested themselves as particularly aggressive weeds, and hand-pulling or hoeing out—especially prior to seeding—or with the larger plants cutting off below the surface of the soil and burning, should prove easy enough.

* For the identification of this plant I am indebted to the Director, Royal Botanic Gardens, Kew, England.

A WEEVIL ATTACKING CAMBODIA COTTON (INDIA).

We are not aware that any Indian cotton has been imported into Queensland, but if so, it may be well to bear in mind what the Acting Government Entomologist, Madras Agricultural Department, writes in the "Year Book" of that Department for 1918, concerning a small beetle pest of cotton, called the "Stem Weevil," an insect about an eighth of an inch long, resembling more or less, the rice beetle.

This insect appears to be confined to the Coimbatore district. In none of the other cotton tracts of South India has it been noted. There is not sufficient ground yet to state with any amount of authority that the insect is one of the many introduced forms in India. But, that it should be found in widely distant areas, such as Behar and Coimbatore, without being found anywhere between these two, shows something surprising regarding the distribution and occurrence of this insect. The adult weevil is not directly concerned in the damage to the plant. It is the young one called the "grub" that causes the damage to the plant stem. The short, thick-set, smooth, fleshy grub bores through the stem tissue, and affects the growing plants seriously. All affected plants can easily be detected by the presence of gall-like swellings on the lower regions of the stem usually just above ground level. . . . When young plants are attacked, they are, in most cases, killed, as the slender stem is unable to stand the attack. In the case of those grown up (say, four or five months), though the stem is infested and nodes are formed, though many dry up altogether, several plants withstand the same. A strong wind, however, lodges the heavier plants, the stem getting bent just near the nodular swelling. . . . In bad cases the loss may be put down to be from 15 to 20 per cent. of the usual out-turn.

PLATE 16.—HYPTIS SUAVEOLENS, *Poit*

Plate 17.—Leucas zeylanica, *R. Br.*

Entomology.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigation, from the Entomologist, Dr. J. F. Illingworth:—

"As is usual at this season, the clear cold weather has sent all the grubs deep into the soil; and the lowered temperature has had an excellent effect upon the cane, increasing the density. Fortunately, there has been no heavy wind and most of the cane injured by grubs has remained standing, so that it is cutting out well.

"Considerable time during the past month has been spent in the breeding and liberation of the Tachinid parasites of the borer beetle, which I recently brought from the Mossman district.

"Harvesting at Greenhills.

"The cane of the infested area on this estate is giving unexpected results. For a time, after the grubs made their appearance, most of this cane appeared to be doomed. The continued rains, however, saved the day, and since little of the cane fell down it has not deteriorated materially.

"The early-planted cane in field F3, referred to in several preceding reports, is now being cut. It will be recalled that one-half of this field was treated with a green crop of Mauritius beans previous to planting, while the remainder of the field was left fallow. The devastation of the grubs became apparent on the fallowed portion fully three weeks before it began to show on the treated area. In fact, I think that if the rains had not been so delayed, the cane in the bean-plot would have carried over with little sign of injury. Due to the combined action of the grubs and the continued drought, however, the cane of both areas was very brown in April, and gave every appearance that it was doomed.

"It is encouraging, therefore, to be able to report that a remarkable crop is now being harvested on the bean-area. The Badila sticks are very heavy, and average 4 to 5 feet in length. These results are in marked contrast to the fallowed portion of the field, where the cane is badly stunted and shows only about half the length of sticks. Later, I shall be able to present figures showing the weight per acre on each of these areas, which, I am satisfied, will demonstrate the value of green manuring on these grub-infested red soils.

"Arsenic for Grubs.

"I recently learned from Mr. R. Blackwell, a farmer at Riverstone, near Gordonvale, that he was applying arsenic for grubs in the drill with meatworks manure at the time of planting. He told me that he was using the arsenious acid (white arsenic) at the rate of 70 lb. per acre, and that he was using this amount upon the advice of a grower at Innisfail. Three hundredweight had been applied at the time of my visit, and as much more was to be put in as soon as it was procurable. The poison was mixed in the manure spreader at the rate of about 20 lb. per bag of the manure, which was applied at the rate of about 5 cwt. per acre.

"As will be noted from my last report, this is the amount of poison used by Mr. C. E. La Caze, on the Herbert River, years ago. Undoubtedly this amount is excessive; and though it may not injure the cane, it is expensive, if used on a large scale. Probably 20 lb. of arsenic will be found to give just as good results where it is centralised by placing it with the plants in the bottom of the drill. At any rate, our results on the Meringa plots would point to this conclusion.

"Beetle Borer Parasites.

"The beetle borer is becoming increasingly prevalent in the Cairns district, particularly in the rainy portions. This is probably due to the cyclone-damaged cane last season, and to the fact that it is sometimes not possible to get a good burn on the trash in the wet areas. Then, too, there has not been sufficient care in the selection of plants. Apparently a very few of this pest, introduced with the seed, are able to populate the field in a single season, so that even the plant cane is considerably damaged. As has been pointed out, it is not so much the cane eaten by these beetles and their grubs, considerable as it often is, but far greater is the deteriorating effect on the whole shoot. Usually, the first injury is near the ground, cutting off the supply of sap, hence growth is hindered and deterioration soon sets in. About 350 of the parasites were secured on my last trip to Mossman, during June, and these have been cared for in a large cage, located in a borer-infested

field at Meringa. From time to time small lots of flies have been liberated here, after they have mated in the cage. Also, from this lot I have small colonies of the flies at Moolaba, Babinda, and Gordonvale.

"At Moolaba I placed the flies in the twelve-months-old plant cane on the farm of Mr. P. C. H. Rutherford on 16th June. Though this is new land at the back of the farm it is full of borers, which should give the flies every inducement to get right to work. Young plant cane, three months old, is alongside, and there is a great expanse of cane up and down the valley for miles, since this farm is about the centre of three blocks of 1,280 acres each. Most of the cane in this region of abundant rains is of rank growth, hence ideally suited to the work of the beetle-borer.

"Dr. Knowles, at Babinda, called my attention to considerable damage on his estate by borers, and I made arrangements with him to leave a small area unburned, where I liberated a colony of the flies. A lot of the borer-infested cane had fallen, and ants (*Pheidole megacephala*) were exceedingly abundant, cleaning out the old borer channels, which they live in during the wet season. I noted that one of these predators seized one of my flies by the foot, while it was feeding on cane juice, just after being liberated. The poor fly appeared to be helpless as if paralysed by the death grip of the ant, but after I removed it she flew away as if in perfect condition. This helps one to understand the difficulties of establishing these friendly insects when their enemies are omnipresent. Fortunately, there are few jumping spiders in the cane fields here; for I found that at Fiji they were eternally after the flies.

"At Gordonvale two colonies of the mated flies were liberated on the farm of Mr. R. Blackwell, on the Riverstone road. His fields were seriously affected with borers last season, and I found that even his young plant cane is infested. There is a considerable infested area in this immediate region, so that the flies will find plenty to do if they once become established.

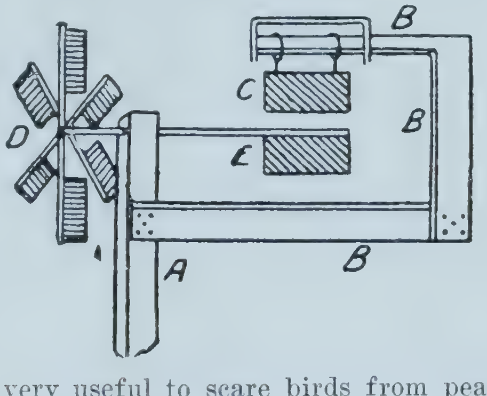
"While at Moolaba, I found that the cutters were in the field where Mr. Girault liberated the flies last year. Borers were found to be plentiful, but after a careful examination of infested stalks near the box where the parasites were liberated, I failed to find any evidence of the flies. It will be recalled that ants got into the box of canes containing the parasites, so these predators may have destroyed all of them as they emerged.

"I found similar negative results when I examined the cane on Dr. Reed's farm at Babinda. Mr. Girault took a box of canes for this farm at the time that he located those at Moolaba. This box was also placed so that ants got into it before the flies had emerged, and I doubt if any got away safely.

"By the present method of liberating the flies, after they have mated in the large cage, they will undoubtedly have a better opportunity to escape their mortal enemies and establish themselves."

A BIRD SCARE.

Many are the devices for keeping birds, especially sparrows, from our flower and vegetable beds. The accompanying sketch, taken from the "South African Farmers' Advocate," appears to be what is required in Queensland gardens to scare away the sparrow. It is well worth a trial, where black cotton, imitation hawks, &c., have failed.



This contrivance is very useful to scare birds from peas and small seeds in the garden, and half a dozen have been effective in an orchard block. This is the method of making: Fasten six pieces of cardboard or thin pieces of wood to sticks, and attach them all to a rod, as at D. This rod goes through a hole in the post A. On the end of the rod D fasten a piece of wood, E, so that when it revolves it will knock against the piece of tin, C, swinging from B. All the frames lettered B are fastened to the post A. The faster the wind carries D around, the more noise is made.

Science.

WATER-DIVINING.

By ARTHUR MORRY.

Mr. Arthur Morry, Surveyor to the Department of Agriculture, has contributed to the "Daily Mail" the following paper on the above subject. Mr. Morry has not only been successful in locating underground streams, but he has also been able to state whether the water is salt or fresh, at what depth it may be found, and even the width and depth of the stream.

An instance of his powers in this vital problem of locating water was lately shown by the discovery of a running underground stream of water at Indooroopilly on Mr. Carr's Jersey Stud Farm.

Early in August, at Mr. Carr's request, he visited the farm with the object of trying to secure a good water supply for his valuable stock:—

"A well was already in existence, the water of which was intensely salt. Within a few minutes a site was pointed out, not more than 50 yards from the existing salt well, where it was stated a plentiful supply of good water would be obtained in a bed 20 yards wide crossing the salt stream almost at right angles, at a depth of not more than 20 feet. On Saturday afternoon, 2nd August, I received a 'phone message from Mr. Carr, stating that a good supply of splendid water had just been reached in a bed of gravel after sinking through 15 feet of clay, the water coming in so fast that further sinking was unnecessary. The bearings of both these streams were taken, when on the ground, and it was calculated that they crossed each other almost at right angles, within a distance of from 10 to 15 feet. The result of the sinking has proved the diagnosis to be almost absolutely correct. Mr. Carr is a member of the Indooroopilly Shire Council, and can substantiate these statements.

"There is nothing 'supernatural' about this, which is only one of many similar cases I could mention; what I am anxious to know is: What is the power that enables this to done? Could any geologist have gone on to that farm, and in a few minutes have determined the site of a fresh water supply as distinguished from salt? With most, if not all, diviners, the rod or wire will only indicate moving water. At Ayr, in the Burdekin delta, on the Don River, near Bowen, again at Cairns, and other places, water may be obtained almost anywhere by putting down a 'spear' but the rod will not indicate that, in my hands, at all events; but where that underground water is slowly finding its way to the outlet, whether it be the river or the ocean, these streams, no matter how slowly they are moving, can be detected. On the esplanade at Cairns one moonlight night I detected six such overflows passing into the ocean.

"There are still many like 'Geologist' who persistently regard it as a 'superstition' simply because they cannot understand it. In support of that view 'Geologist' gives his experiences with a squatter friend in New South Wales, who thought he possessed this power of finding water and selected a site for himself, which, alas! yielded no results at 120 ft. But how many of our subartesian supplies are obtained at depths much greater than that? No, we are not misled or misguided by what he calls the will-o'-the wisp mysticism, instead of sound reason; the reason is on the side of those who plead for scientific research, and for its persistent pursuit until the problem is solved. If great scientists like Sir Oliver Lodge and other eminent University professors who have grappled with it have not so far succeeded, there is no reason why others in the light of further knowledge may not be more successful. There is more known about water-divining to-day than ever before, and it would be a splendid discovery for our young Australian scientists to be able to reduce the theories which have been advanced to facts, or to establish this as a branch of science on a firm foundation.

"'Geologist' states that a diviner may be successful in well-defined subartesian country, but that in basaltic or granitic country he would be at fault, because in those areas water is only to be found in the cracks and fissures of the rocks. Now, this is the very country in which the divining-rod has been remarkably successful in discovering these fissures, with an inexhaustible supply. I have a friend who operated a power-driven boring plant in country of this description on the 'no-water-no-pay principle.' His sites were selected by himself with the divining-rod, and in no case did he fail to secure a supply and to draw his fee, though the drilling was, in nearly all cases, through hard granite.

"Another correspondent, W. Rutland, asks if any modern geologist has expressed his belief in the theories enunciated. I cannot name one, and I do not expect to hear of such a one until the idea is dissipated that it is impossible for geology and water-finding, as at present practised, to work together. He also relates his experiences, which inclined him to be sceptical, because water had not been found at 30 ft. when it was expected at 20 ft: but water-divining is not yet an exact science, and the depth, so far as my own experience goes, can only be stated approximately, but in many cases it is remarkably correct. Twelve years ago I was as sceptical as anyone. By accident I discovered I possessed the faculty, or whatever it may be called, and since then I have selected scores of sites, and in every case, where tested, they have been successful. Before discovering the method of detecting salt from fresh water, in several cases the former was obtained, but since that discovery no mistakes are possible with due care, although it often happens that a salt stream may be passed through before reaching the fresh water.

"Again, I appeal to our scientists to make this a matter of study. In a country like this, where water is of the utmost importance, no means of discovering its location should be ignored. My position brings me in almost daily touch with those who are crying out urgently for water—water everywhere—and it is painful to think that it is not secured when in most cases it is easily within reach, and at a moderate cost, if it was only known.

"I should like to see a committee of investigators formed consisting of a few geologists, chemists, electricians, engineers, and agriculturists, who would thoroughly test in every way the remarkable phenomenon of water-divining, especially the recent discoveries to which reference has been made; and as an operator myself I invite the closest scrutiny."

PONDS ON TOP OF HILLS.

CONSERVATION OF WATER.

Jack and Jill, according to the old rhyme, went up the hill to fetch a pail of water (says C.B. in the London "Daily Mail"). That this statement may not have been purely poetical licence seems to me proved by the fact that high on the South Downs are to be seen many ponds, which, though not fed by springs or surface drainage, yet maintain a supply of water for stock even in the hottest and driest summers.

These "dew" ponds or "mist" ponds, as they are called in Surrey, are of enormous antiquity, and are said to have been used to supply the hill camps of Neolithic man.

Naturally such ponds are of the greatest value to farmers and shepherds, and of late years investigations have been carried out with a view to discovering the secret of their constant supply. These investigations go to show that the term "mist" pond is probably the true one, and that the water comes, not from dew, which, after all, must be an insignificant contribution, but from mist, or wet fog. These mists are of two kinds—the summer mist of a still and cloudless night, and the driving mist produced by a wet south-west wind on the sea.

SUPPLIES REPLENISHED.

The secret of making these pools is to dig them with a wide, gently sloping margin, and to make the bottom as watertight as possible. In Young's "Agriculture of Sussex," published in the year 1808, it is stated that "many farmers in the neighbourhood of Eastbourne have been at great trouble and expense in forming these ponds, which is done by lining them with chalk puddled and trod down till it makes a kind of plaster floor."

A pond on the top of Friston Hill which has never gone dry has the bottom paved with small flints set in puddled chalk.

On the western side of the Weald, clay is used, rammed hard. This is covered with a "putty" of lime. Upon this comes a layer of straw, then 10 in. or 12 in. of chalk rubble. The straw lining is no doubt meant to act as an insulator.

More recently, dew ponds on the Dorsetshire Downs have been lined with concrete, and have proved successful in holding and keeping water.

The higher the situation of the pond and the more exposed the more constant seems the supply of water. Two of these ponds near Chanctonbury have yielded water when ponds in the valley below were quite dried up. From others as many as fifty sheep have been watered daily without exhausting the supply.—*Exchange.*

General Notes.

PLANTAIN FLOUR.

A paragraph appeared in the "Daily Mail" of 31st July, concerning a suggestion from the North, that, in view of the dearth of wheaten flour, a very good substitute might be found in banana or plantain flour. The Director of Fruit Culture, however, pointed out that the selling value of the banana itself, and the food value of ripe bananas without treatment, was too great in each case to warrant any trouble or expense in converting it into flour.

"Tropical Life," Ceylon, in its issue of June, 1919, publishes the following extract from the "Bulletin of the Department of Agriculture," of Trinidad and Tobago, vol. xvi., No. 2, entitled—

NOTES ON THE PREPARATION OF FLOUR SUBSTITUTES, by R. V. Williams, Curator, Royal Botanic Garden, Trinidad.

"As a substitute for wheaten flour, plantain flour is probably one that will be made the greatest use of, as it is the cheapest to produce. We have also a number of other starchy foods that can be used, some of which will be described in detail.

"Plantain flour can be made from any kind of plantain, although it is generally recommended to use those plantains such as the "Red fig" which at the present time are scarcely used at all in Trinidad. On some large estates quantities of this plantain can be seen. From a bunch of silk figs the hands were cut off and weighed; they yielded 26.19 per cent. of flour.

"When cutting the plantains, it is better to cut them before they are quite full than to leave them till they are beginning to ripen, as if too full, they will, after slicing, ripen in the sun, be very difficult to dry and produce a sweet flour. The process of peeling and slicing is a simple one, and can be done most economically by boy labour, the boys becoming quite expert and performing the work quickly and well after a few bunches have been done. Steel knives should not be used on the green fruit as they blacken them unless immersed under water the whole time. A nickel or fruit knife is the best tool to use.

"When slicing the plantains the thinner they can be cut the better, as it is essential for them to dry quickly. In the dry season no trouble is experienced, and they will dry thoroughly in a couple of days if spread on wooden trays in the blazing sun. In the rainy season it is a different matter and it is best to choose a fine morning for the work, and if a shower comes on remove them to a dry warm room. A drying room with hot air going through it would be necessary on a large scale, but when doing a few bunches for the home, this is not needed as they can always be dried in trays on a warm grate. As soon as the chips are dry they are ready for milling. On a small scale they may be pounded, grated, or better still ground in an ordinary corn-mill which can be bought from about two dollars upward. After buying the plantains and paying for the labour, the flour can be produced for about three cents a pound; therefore for those who grow their own plantains and use their own labour, the cost is practically nil.

"The uses of plantain flour are many and varied: It would be as well here to mention that as a food substitute plantain flour is most valuable, it being very digestible; so much so, in fact, that well-known medical authorities have recommended its use for the feeding of children and invalids; we need therefore have no fear of bad consequences to our health by using plantain flour.

"Plantain bread is best made from a mixture of wheaten flour and plantain flour, but in what proportion is a question for the consumer to judge for himself. Personally, I use it and find it very wholesome, mixed in the proportion of two parts plantain flour to one of wheat flour, other people may prefer it half and half, or one part of plantain flour to two of wheat flour. The bread is dark in colour, or lighter according to the amount of wheat flour added, this probably being the only reason why some people prefer the addition of wheat flour in large proportions. The addition of a certain proportion of wheat flour is necessary to give the bread the proper consistency.

"The making of bread can easily be done by the housewife. Occasionally for some reason a little difficulty is found in getting the plantain flour to rise, when the dough is made with yeast, and it has been recommended to set the doughs separately and combine them kneading. A similar process, I think, is to make the bread with

baking powder, when it never fails to rise. Take care in mixing, however, not to make the flours too wet, as the plantain flour is not capable of taking up so much moisture as the wheat flour.

"Plantain flour cooked and eaten as oatmeal porridge is an excellent food and should entirely replace oatmeal on the breakfast table at the present time.

"In cake making, the same proportions of plantain flour can be used as in the making of bread.

"Used in the form of a milk pudding, made in the same way as a rice pudding, it is also very palatable.

"Plantain biscuits can also be made from the flour, in fact they have been known in Europe as a fancy biscuit for a long time."

CURING THE LEMON.

PRACTICAL HINTS.

In response to a request from an interested reader for information concerning the curing of the lemon, we publish the following excerpts from "Fruit World" Mr. W. J. Allen's book on "Citrus Culture":—

While there is no country where lemons will thrive better than in Australia, and perhaps none where the fruit can be more easily cured than in the drier parts, some difficulty has been found, on the other hand, in curing them where they have been growing along the coast, where there is more humidity in the atmosphere. They can, however, at least, be kept for a short time after picking—long enough, at any rate, to greatly improve the condition of the fruit. No one can fail to notice the difference between a cured and uncured lemon. The one has a nice fine skin, and is full of juice, whilst the other is hard and thick-skinned, and it is difficult to extract the juice.

To begin with, the fruit must be picked carefully, and not handled like potatoes, but more after the manner of handling eggs, as decay is liable to set up in any bruised part. The method of procedure should be quite different to that now practised by a majority of growers, who simply pull the fruit from the tree in a very careless manner, and, in a still more careless fashion, roll or drop them into a basket or case, and these, in turn, are again dumped into another receptacle, perhaps a cart, without any regard as to whether bruising is caused in the process or not. From the cart the fruit is very often simply packed into cases, without any pretence at curing.

During those years when lemons are scarce they frequently command good prices, even though handled in this way; but during normal seasons there is generally a month or two, when the bulk of the fruit is ripening, when the grower is not moved to exuberance over his returns. If then, by some means, he could tide over such a season, by holding the bulk of his lemons until the markets assume a more favourable tone, it would make a material difference in his income.

A start should be made by picking a portion of the crop before it becomes too ripe—during the months of May, June, and July—and store such fruit away in well-ventilated, dry cool buildings either in boxes or trays, and see if by handling the fruit carefully it will not keep until there is more demand for it. It is always more easy to store small than large quantities; therefore the larger the quantity to be experimented with, the more careful will the grower have to be about the building in which he keeps his fruit. A small closed room may be a capital place in which to keep a few lemons, but perhaps not at all suitable if the room was filled with fruit. We neither want the lemon to sweat, nor do we want it to shrivel; and if we can strike the happy medium, we are on the right track.

It has been demonstrated, both here and in California, that lemons keep best when pulled just as they are beginning to turn ripe, and that, on the contrary, they do not keep so well when allowed to hang until quite ripe.

They are best picked as soon as they are about $2\frac{1}{2}$ in. in diameter. When they are over $2\frac{3}{4}$ in. they are over size, except for making lemon peel, when a good thick-skinned 3 in. lemon suits addmirably. But we are now talking of lemons for curing, and for this purpose they should be picked when they attain the proper size, even though almost green. They should be allowed to stand for a few days and then packed away in paper-lined boxes, which may be stacked in blocks in such a manner as to permit a free circulation of air around each case.

A packing-house in use by Mr. Lippingwell, of Whittier, gives a fair idea of what a curing-house should be. The building is large and airy, being 250 ft. long and 150 ft. wide, and is about 3 ft. clear of the ground. This gives a good circulation of air beneath the floor, which is most important. There are no permanent partitions in the building; the stacks of cases are arranged in blocks of four, separated by a narrow space of about 2 ft.; these blocks run in rows the length of the building, being separated by a passage about 4 ft. wide running transversely. The rows thus formed are placed 12 ft. apart; in this way a large passage or alley-way is left for packing, &c. [The curing and packing house described here is an exceedingly large one, but should form a basis from which the requirements of growers could be estimated, and reduced proportionately to meet same.—Ed. "F.W."]

In California the blocks of cases are so built that a canvas covering, 10 ft. x 10 ft. x 20 ft., made box-shape, will cover them, the canvas being open at the four corners, and the corners so arranged that they may be laced quite tight, or, if necessary, loosened, and the sides of the box or tent raised so as to admit more air and allow any superfluous moisture to escape. After the fruit has been stored for a few weeks, the sides of the tent seldom require raising if the curling-shed is well ventilated. If it is found that the lemons are keeping well, they may be left under the covering for several months until they are thin-skinned and pliable; but they should be marketed before the skin begins to harden in the least. If any of the lemons are decaying in the cases, the fruit may be sorted over every month or six weeks, and all specimens removed which show signs of decay or loss of condition.

The method described is the best that has been practised up to the present, but I think that before many years even this will be improved upon. The object in curing lemons is to reduce the thickness of the peel and make it tough—to increase juiciness and to maintain a good condition for a favourable market.

ARMY'S AIRCRAFT TO COMBAT FIRES.

Army airplanes and captive balloons will cover portions of the national forests of California, Arizona, New Mexico, and other States this summer, to aid in detecting and suppressing forest fires. In compliance with an order from Secretary Baker directing the Air Service to co-operate with the Forest Service of the United States Department of Agriculture in this work, conferences are under way to determine where and to what extent the air scouts will supplement the forest rangers.

That there is a distinct and important place for aircraft in fire protection of timber lands is regarded by the Forestry officials as beyond doubt, but experimental trial of methods and possibilities will have to be the first step. This is now being planned for the coming fire season. Army airdromes and bases will be utilised for the experiments. Some of the bases near enough to national forests to be used advantageously are the flying fields at San Diego, Riverside, and Arcadia in southern California. Other points in the West and in the East are under consideration, including one near the White Mountains in New Hampshire.

One of the interesting possibilities to be tested is bombing fires to put them out. It is believed that bombs charged with suitable chemicals can be used with good results. Another plan to be tested is transporting fire fighters by dirigibles from which ladders can be lowered to the ground.

The chief use of the aircraft this summer, however, will be for fire detection. At present the Forest Service relies for this partly on patrol, usually by men on horses, motor cycles, or railroad speeders, and partly on watchers stationed at lookout points. Aircraft have many points of obvious superiority for both classes of detection work.

Lookouts in a very broken country, cut up by deep canyons or where mountain ridges obstruct the view, or in a flat country that affords no good points of vantage, are often unable to pick up all fires quickly by the rising smoke, or to locate them accurately. For precise location the system in use depends on triangulation through reports telephoned from separate observation points. Airplanes would use wireless in reporting fires, as they have done in communicating with the artillery, and would locate fires by co-ordinates in the same way that gunfire in war is directed to a particular spot or object.

From the Army standpoint, the use of aircraft in protecting the national forests affords a valuable opportunity for training fliers and developing further the possibilities of aircraft and the art of flying.—"Hawaiian Forester."

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST, 1919.

Article		AUGUST. Prices.
Bacon	lb.	11½d.
Barley	bush.	5s. 3d.
Bran	ton	£8 15s.
Broom Millet	"	£30 to £40
Broom Millet (Sydney price)		£65
Butter (First Grade)	cwt.	177s. 4d.
Chaff, Mixed	ton	£8 10s. to £10
Chaff, Oaten	"	£10 15s to £13 5s.
Chaff, Lucerne	"	£12 10s. to £15 15s.
Chaff, Wheaten	"	£8 7s. 6d. to £10 15s.
Cheese	lb.	11d.
Flour	ton	£14
Hams	lb.	1s. 3d. to 1s. 10d.
Hay, Lucerne	ton	£11 10s. to £12 15s.
Hay, Oaten	"	£13 15s.
Hay, Wheaten	"	£8 to £10 10s.
Honey	lb.	5d. to 5¾d.
Maize	bush.	6s. 9d. to 7s. 4d.
Oats	"	8s.
Onions	ton	£23 to £26 10s.
Peanuts	lb.	5d. to 6d.
Pollard	ton	£9 5s. to £10 5s.
Potatoes	"	£16 to £24 15s.
Potatoes (Sweet)	cwt.	8s. 2d. to 10s. 4d.
Pumpkins (Cattle)	ton	£2 10s. to £4 5s.
Eggs	doz.	10d. to 1s. 2d.
Fowls	per pair	5s. to 12s.
Ducks, English	"	3s. 6d. to 5s. 3d.
Ducks, Muscovy	"	3s. 6d. to 10s.
Geese	"	6s. to 8s.
Turkeys (Hens)	"	14s. to 16s.
Turkeys (Gobblers)	"	32s. to 40s.
Wheat (Milling)	bush.	5s. 3d.

VEGETABLES—TURBOT STREET MARKETS.

Beans, per sugar-bag	10s. to 14s. 6d.
Beetroot, per dozen bundles	1s. to 1s. 6d.
Cabbages, per dozen	2s. 5d. to 8s. 6d.
Carrots, per dozen bunches	9d. to 1s.
Cauliflowers, dozen	4s. to 20s.
Celery, per bundle	1s. 6d. to 2s. 3d.
Cucumbers, per dozen	1s. to 1s. 3d.
Lettuce, per dozen	6d. to 1s.
Marrows, per dozen	1s. to 2s. 6d.
Parsnips, per dozen bunches	...
Peas, per sugar-bag	7s. 6d. to 12s.
Potatoes (Sweet), per cwt.	8s. 2d. to 9s. 3d.
Pumpkins (table), per cwt.	2s. to 4s.
Tomatoes, per quarter-case	4s. to 10s. 6d.
Tomatoes (inferior), per quarter-case	1s. 6d. to 6s.
Turnips, per doz. bunches	3s. to 4s.
Turnips (Swedes), per cwt.	1s. 6d. to 3s. 9d.

SOUTHERN FRUIT MARKETS.

Article.	AUGUST. Prices.
Bananas (Queensland), per case	...
Bananas (Tweed River), per case	20s. to 24s.
Lemons (Victorian) per bushel-case	10s. to 12s.
Mandarins (Queensland), per bushel-case	11s. to 14s.
Oranges (Queensland), per bushel-case	11s. to 13s.
Oranges (Navel) per case	14s. to 15s.
Passion Fruit (Victorian), per bushel-case	16s. to 25s.
Pears, per half-bushel case	4s. to 8s.
Pineapples (Queens), per double-case	12s. to 13s.
Pineapples (Ripleys), per double-case	7s. to 9s.
Pineapples (Common), per double-case	7s. to 11s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel-case	16s. to 20s.
Apples, Cooking, per bushel-case	8s. to 12s.
Bananas (Cavendish), per dozen	4d. to 10½d.
Bananas (Special), per dozen	1s. 6d.
Bananas (Sugar), per dozen	3d. to 8d.
Cape Gooseberries, per box	6s. to 16s.
Citrons, per cwt.	7s. to 12s.
Cocoanuts, per sack	15s. to 25s.
Custard Apples, per quarter-case	4s. to 10s. 6d.
Lemons (Lisbon), per half-case	3s. 6d. to 6s. 6d.
Lemons (Imported), per bushel-case	14s. to 17s.
Lemons (Rough), per bushel-case	3s. to 4s.
Loquats, per case	5s. to 9s.
Mandarins, per case	6s. to 17s 6d.
Oranges, per case	4s. to 15s.
Oranges (Navel), per case	14s. to 18s.
Oranges (Seville), per cwt.	12s. to 17s.
Papaw Apples, per quarter-case	1s. 6d. to 5s.
Passion Fruit, per sugar-bag	4s. 6d. to 8s. 5d.
Peanuts, per lb.	4d. to 6d.
Pears, per case	14s. to 17s. 6d.
Pineapples (Rough), per dozen	2s. to 4s.
Pineapples (Smooth), per dozen	6s. 6d. to 8s. 6d.
Pineapples (Ripley), per dozen	2s. 6d. to 4s. 6d.
Rosellas, per sugar-bag	4s. 6d. to 5s. 9d.
Tomatoes (prime), per quarter-case	6s. to 8s.
Tomatoes (inferior), per quarter-case	2s. to 4s.
Strawberries, per dozen boxes	6s. to 15s.

TOP PRICES, ENOGGERA YARDS, JULY, 1919.

Animal.	JULY. Prices.
Bullocks	£21 10s. to £24
Cows	£16 10s. to £17
Merino Wethers	43s. 9d.
Crossbred Wethers	59s. 6d.
Merino Ewes	31s. 6d.
Crossbred Ewes	50s.
Lambs	35s.
Pigs (Bacon)	78s.
Pigs (Porkers)	51s.
Pigs (Slips)	20s.

LONDON QUOTATIONS.

AUGUST.

Cotton (Uplands): 21d. per lb.
Jute: £67 per ton.
Hemp: £51 10s. per ton.
Rubber: Pará, 2s. 6d. per lb.; Plantation, 2s. 1d. per lb.
Linseed oil, 126s.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, 1919, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1919 AND 1918, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1919.	July, 1918.
North Coast.	In.		In.	In.
Atherton	0·89	18	0·66	0·68
Cairns	1·55	37	3·01	2·80
Cardwell	1·42	47	0·16	0·51
Cooktown	0·99	43	0·87	2·40
Herberton	0·63	32	0·49	0·99
Ingham	1·55	27	0·09	0·41
Innisfail	4·63	38	4·46	3·75
Mossman	1·43	11	1·17	1 48
Townsville	0·54	48	0·02	*nil*
Central Coast.				
Ayr	0·55	32	*nil*	0·18
Bowen	0·93	48	*nil*	0·09
Charters Towers ...	0·55	37	*nil*	*nil*
Mackay	1·63	48	0·44	1·45
Proserpine	1·04	16	0·58	1·03
St. Lawrence ...	1·23	48	*nil*	0·10
South Coast.				
Biggenden	1·28	20	0·22	0·30
Bundaberg	1·94	36	*nil*	0·40
Brisbane	2·22	68	0·18	0·17
Childers	1·66	24	0·03	0·38
Crohamhurst ...	2·92	25	1·35	0·32
Esk	1·93	32	0·14	0·15
Gayndah	1·50	48	0·04	0·27
Gympie	2·14	49	0·38	0·39
Glasshouse M'tains	2·17	11	0·68	0·27
Kilkivan	1·73	40	0·24	0·59
Maryborough ...	1·96	48	0·30	0·40
South Coast—continued:	In.		In.	In.
Nambour	2·59	23	1·65	0·87
Nanango	1·73	37	0·12	0·15
Rockhampton ...	1·43	32	*nil*	0·04
Woodford	2·50	32	0·58	*nil*
Darling Downs.				
Dalby	1·79	49	0·08	0·09
Emu Vale	1·40	23	0·23	0·38
Jimbour	1·70	31	0·11	0 04
Miles	1·78	34	0·18	0·02
Stanthorpe ...	1·94	46	0·27	0·59
Toowoomba ...	1·99	47	0·27	0·44
Warwick	1·76	32	0·13	0·23
Maranoa.				
Roma	1·40	45	*nil*	0·24
State Farms, &c.				
Bungeworgorai ...	0 99	5	*nil*	0·24
Gatton College ...	1·32	20	0·04	0·16
Gindie	1·16	19	*nil*	0 07
Hermitage ...	1·41	13	0·12	0·35
Kairi	0·89	5	*nil*	0·84
Sugar Experiment Station, Mackay	1 33	22	0·15	0·97
Warren	0·76	5	*nil*	*nil*

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year, and for the same period of 1918, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	September.		October.		November.		December.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·30	5·47	4·59	6 4	4·46	6·27
2	6·2	5·34	5·29	5·48	4·59	6·5	4·46	6·28
3	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·29
4	6·0	5·35	5·27	5·49	4·57	6·7	4·46	6·30
5	5 59	5·35	5·26	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·25	5·50	4·55	6·8	4·46	6·32
7	5 57	5·36	5 24	5·50	4·55	6·9	4·46	6·32
8	5 56	5·37	5·23	5·51	4·54	6·9	4·46	6·33
9	5 55	5 37	5·22	5·51	4·53	6·10	4·47	6 33
10	5·54	5 38	5·21	5 52	4·53	6·11	4·47	6·34
11	5 53	5·38	5·19	5·52	4·52	6·11	4·47	6·35
12	5 51	5·38	5·18	5 53	4·52	6·12	4·47	6·36
13	5·50	5·38	5·17	5 53	4·52	6·13	4·47	6·36
14	5·49	5·39	5·16	5·54	4·51	6·14	4·48	6 37
15	5·48	5·39	5·15	5·54	4 51	6·14	4·48	6 37
16	5·47	5·40	5·14	5·55	4·51	6·15	4 48	6·38
17	5·46	5·40	5·13	5 55	4 50	6·15	4·49	6·38
18	5·45	5 41	5·12	5·56	4·50	6·16	4·49	6·39
19	5·44	5·41	5·11	5·56	4·49	6·17	4·49	6·39
20	5·43	5·42	5·10	5 57	4 49	6·18	4·50	6·40
21	5·41	5·42	5·9	5·57	4·48	6·19	4·50	6·40
22	5·40	5·43	5·8	5 58	4·48	6·20	4·51	6 41
23	5·39	5·43	5·7	5·58	4·47	6·21	4·51	6·41
24	5·38	5·44	5·6	5 59	4·47	6·22	4·52	6·42
25	5 37	5·44	5·5	5·59	4·47	6·23	4·52	6·42
26	5·35	5·45	5·4	6·0	4·47	6·24	4·53	6 43
27	5·34	5 45	5·3	6·1	4·46	6·25	4·53	6·43
28	5 33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·31	5·47	5 0	6·3	4·46	6·27	4·55	6·45
31	...	...	5·0	6·4	...	...	4·56	6·45

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania, unless "summer time" is adopted.

			H. M.
3 Sept.	☾	First Quarter	12 22 a.m.
10 ,,	○	Full Moon	1 54 p.m.
17 ,,	☽	Last Quarter	7 32 a.m.
24 ,,	●	New Moon	2 34 p.m.

The Moon will be in Perigee on 13th at 6 6 p.m., and in Apogee on the 29th at 3·30 p.m.

2 Oct.	☾	First Quarter	6 37 p.m.
9 ,,	○	Full Moon	11 39 p.m.
16 ,,	☽	Last Quarter	3 5 p.m.
24 ,,	●	New Moon	6 40 a.m.

The Moon will be in Perigee on 11th at 2·54 p.m., and in Apogee on the 27th at 6·42 a.m.

1 Nov.	☾	First Quarter	11 43 a.m.
8 ,,	○	Full Moon	8 35 a.m.
15 ,,	☽	Last Quarter	1 41 a.m.
23 ,,	●	New Moon	1 20 a.m.

The Moon will be in Perigee on 8th at 11·54 p.m., and in Apogee on the 23rd at 12·24 p.m.

1 Dec.	☾	First Quarter	2 47 a.m.
7 ,,	○	Full Moon	8 4 p.m.
14 ,,	☽	Last Quarter	4 2 p.m.
22 ,,	●	New Moon	8 55 p.m.
30 ,,	☾	First Quarter	3 25 p.m.

The Moon will be in Perigee on 7th at 12·48 p.m., and in Apogee on the 20th at 1·36 p.m.

The Moon will cause an annular eclipse of the Sun on Nov. 23rd, but it will not be visible in Australia. There will also be a partial eclipse of the Moon on Nov. 8th which will be visible in England but not in Australia.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets and the moonlight then extends all through the night, when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruitgrower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample—viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit-fly, and take every precaution to keep this great pest in check now, as, if fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

THE TROPICAL COAST DISTRICTS.

As the fruit-fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fly. Banana and pineapple plants may be set out, and the orchards should be kept well tilled, so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crops of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land in good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become commonly known, will meet with a ready sale.

THE SOUTHERN AND CENTRAL TABLELANDS.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. The planting of the sisal agave and the fourcroya may be proceeded with at any time of the year, but the best time is in spring and beginning of summer, when warm weather and good showers will enable the young plants to root quickly and become firmly established before the winter. The demand for the fibre is constantly increasing, and the supply does not nearly overtake the demand; hence prices keep high, and the outlook for the future is very promising. Cotton may still be sown.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus, and other bulbs, such as tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

ELECTRIFICATION OF SEEDS.

Although the application of electricity to growing crops has, at the best, only proved a partial success, it appears that a very decided advantage can be gained by electrifying seeds before sowing. According to the "Scientific American," extensive experiments have been carried out by a certain Mr. Fry, the inventor of the process, in the south of England during the past few years. These have been conducted under ordinary farming conditions, and as many as 2,000 acres of electrified seed, principally wheat, oats, and barley, were sown on different properties last year.

Mr. Fry's investigations are not yet completed, but from the data that have been gathered remarkable results seem to be obtained from treated seeds in comparison with those sown in the ordinary way. In the first place, the yield is much heavier, electrified seed returning from 25 to 30 per cent. more grain. Then the sample itself is of better quality, the increase in weight ranging from 1 to 4 lb. per bushel. Another advantage is that treated seed stools out better, and the straw is longer and stronger. Further, electrified seed appears to be less susceptible to the attacks of fungus diseases and wireworm, but this point has yet to be proved conclusively.

The process of treatment invented by Mr. Fry is simple in principle, though it requires care and experience in application. A current of electricity cannot be passed through a heap of dry seed, so the grain is steeped in water that contains some kind of salt in solution that will act as a conductor. Different kinds of salt are necessary for different seeds and soils, and the strength also has to be varied according to local conditions. The solution is placed in a tank, the seed dipped in it, and a weak current passed through by means of electrodes attached to two opposite walls of the receptacle. The grain is then taken out and carefully dried. Mr. Fry uses a proper drying kiln for this purpose. Sowing must be carried out within a few weeks of treatment.

Briefly, that is the process, but it is stated that unless particular seeds are treated in certain ways (not specified, by the way) as regards the solution used and time spent in steeping, the result is likely to be unsatisfactory. In any case, it is more than probable that any formula that applies in England will not be much good under Australian conditions. Here is a matter for the Commonwealth Bureau of Science and Industry to investigate. Steps should be taken to obtain complete data from Mr. Fry, compensating him liberally if necessary. If it is found that the treatment does all that is claimed for it, farmers ought to be given an early opportunity to apply it here.—"Pastoral Review."

JUVENILE CORNGROWING COMPETITION, 1918-19.

Owing to the extreme dryness of the past season the competition has resulted in a disappoi ment to many of the competitors.

Out of one hundred and seventeen entries only twenty-two competed as a result of t indifferent season.

Generally speaking the maize showed uniformity in character and general ipmroveme in the type selected. In one or two instances, however, the cobs selected leave much to be desir

Though the season has been far from favourable the high average yield of grain per ac has been maintained throughout, this being attributed to improved methods of cultivati and the high quality of seed used.

The highest yield was reached in the Eumundi district, 127·4 bushels per acre being record whilst the average yield throughout reached 69 bushels per acre.

In comparison with the average yield for the State the consistent increase, as shown in t average yield of the plots, is remarkable. It is apparent this is on the up-grade and now stan at thrice that of this State's average yield.

The following data are worthy of note :—

1914-15 the average yield from plots was 39·3. State's average, 24·16.
1915-16 the average yield from plots was 51·3. State's average, 13·68.
1916-17 the average yield from plots was 62·3. State's average, 16·64.
1917-18 the average yield from plots was 85·3. State's average, 26·37.
1918-19 the average yield from plots was 69·0. Incomplete.

The following are tabled results of actual yields of plots, 1918-19 :—

No. of Plots.	Returns per Acre.
3	10-20 bushels.
Nil	20-40 bushels.
7	40-60 bushels.
4	60-80 bushels.
4	80-100 bushels.
3	100-120 bushels.
1	120-140 bushels.

The accompanying graph shows at a glance the progress made as regards yield compar with previous Juvenile Corngrowing Competitions covering a period from 1914-18.

PRIZE WINNERS.

JUVENILE CORNGROWING COMPETITION, 1918-19.

Name and Address of Competitor.	Age in Years.	Yield per acre in bushels.	Quality of maize produced. Maximum Points, 15	Yield of Plot. Maximum Points, 75.	Records of Plots Maximum Points, 10.	Total Maximum Points, 100.	District Priz
No. 1 District.							
1. A. G. Marks, Alberton	17	106·7	10·7	57·9	6·0	74·6	1st, £5; a 3rd Speci £3
2. R. Swallow, Boonah ..	15	98·3	13·7	53·4	5·0	72·1	2nd, £2
3. A. H. Swallow, Boonah	14	92·7	13·5	50·3	4·5	68·3	3rd, £1
4. Miss E. Marks, Alberton	14	87·0	10·5	47·2	6·0	63·7	
5. A V. Rachow, Alberton	17	48·0	9·2	26·0	6·0	41·2	
6. A. W. Miers, Pimpama	17	14·0	8·1	7·6	9·0	24·7	
7. P. J. Schlecht, Rosewood	17	13·1	5·2	7·1	4·5	16·8	
Total number of competitors, 18.							
No. 2 District.							
1. A. H. Sims, Eumundi ..	12	127·4	12·0	69·2	7·5	88·7	1st, £5; a Special, £
2. E. A. Sims, Eumundi ..	14	111·5	13·5	60·6	6·5	80·6	2nd, £2; 2 Special,
3. R. H. Pickering, Eumundi	15	78·4	9·3	42·6	4·5	56·4	3rd, £1
Total number of competitors, 19.							

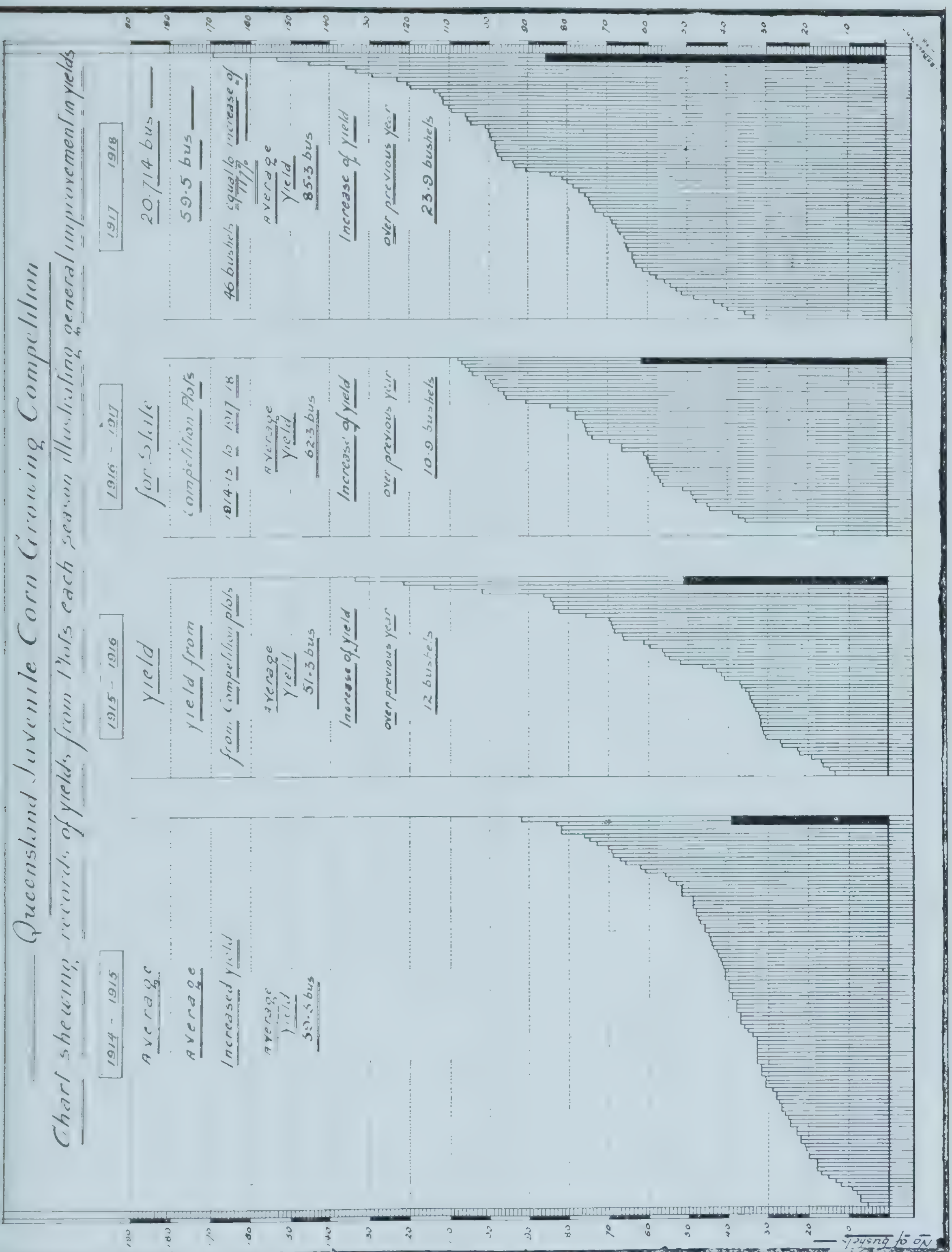

PLATE 19.—CHART SHOWING RECORDS OF YIELDS FROM PLOTS EACH SEASON.

PRIZE WINNERS—*continued.*

JUVENILE CORNGROWING COMPETITION, 1918-19—*continued.*

Name and Address of Competitor.	Age in Years.	Yield per acre in bushels.	Quality of Maize produced. Maximum Points, 75.	Yield of Plot. Maximum Points, 75.	Records of Plots, Maximum Points, 10.	Total Maximum Points, 100.	District Prize.
			No. 4 District.				
1. N. A. Campbell, Murgon	14	52·0	11·1	28·2	6·0	45·3	1st, £5
2. P. W. Dossel, Memerambi	15	55·6	8·4	30·2	5·0	43·6	2nd, £2
3. N. J. Dossel, Memerambi	12	42·5	8·2	23·1	5·0	36·3	3rd, £1
4. E. Dossel, Memerambi	10	41·0	8·4	22·2	5·0	35·6	
Total number of competitors, 13.							
			No. 5 District.				
1. T. C. Williams, Crow's Nest	17	73·5	12·6	39·9	7·0	59·5	1st, £5
2. W. Siebenhausen, Allora	12	79·0	11·2	42·9	4·5	58·6	2nd, £2
Total number of competitors, 25.							
			No. 6 District.				
1. L. Meredith, Gurgeena	17	52·7	9·9	28·6	2·0	40·5	1st, £5
2. Miss W. Meredith, Gurgeena	14	19	8·4	10·3	2·5	21·2	2nd, £2
Total number of competitors, 8.							
			No. 7 District.				
1. D. H. Vohland, Quinalow	14	94·7	11·4	51·4	4·0	66·8	1st, £5
2. W. York, Wallumbilla ..	15	78·9	9·3	42·8	4·5	56·6	2nd, £2
Total number of competitors, 16.							
			No. 8 District.				
1. Miss M. Wilson, Yeppoon	17	56·5	9·0	30·7	5·5	45·7	*
* Only one competitor—Awarded a second prize, £2.							
			No. 9 District.				
1. L. A. Favier, Kairi ..	17	106·2	11·7	37·7	2·5	51·9	1st, £5
Total number of competitors, 2.							

N.B.—No. 3 District, 14 competitors, none of whom completed.

COTTON GROWERS' COMPETITION.

The "South African Sugar Journal" (July, 1919) states that "The British Cotton-Growing Association have again shown their keen interest in developing the cotton industry of the Union by offering £262 10s. as prizes for two competitions to be held during the forthcoming season.

The first competition will be for 50 acres of cotton, and the prizes will be as follows:—First prize, £100; second prize, £50; third prize, £25.

The second competition will be for 10 acres or more, but less than 50 acres:—First prize, £50; second prize, £25; third prize, £12 10s.

The conditions of these competitions will be published later.

MORE ABOUT FLAX-GROWING.

SPREADING.

Spreading of flax should take place shortly after the flax has been removed from the steep, or immediately after it has been carted or carried to the drying ground. A clean grazing ground or grass land with the rough grass all cut away or burned off should be selected and free from the shade of trees. The spreading is chiefly done by women in Ireland, as they are much quicker than men at this work. Spreading should commence as soon as the first load of flax is brought to the drying ground, for, if allowed to become dry in the "beets," it is more difficult to shake it out evenly.

Each spreader, standing with the back to the prevailing wind, and having an open beet of flax in the left arm, takes a handful from it, and lays this down on the grass with the root ends towards himself, spreading it out with the right hand, and shaking it evenly and thinly. If properly shaken, it can be put down fairly thick in the rows running from right to left of the spreadfield, keeping each spreader a few steps in advance of the other following, and the tops of each row overlapping the roots of the preceding one about three inches, as the root ends of the flax are coarse and easily dried, and no injury is done to them. Should any little locks be left unshaken, they may not dry evenly, and the flax will show a streaky unevenness in colour when dressed. If the directions in handling the flax when going through the pulling and threshing processes have been attended to, the spreaders would find no difficulty in spreading without tangling or dragging the stalks. The bands or ties, if properly made ones, should now all be placed on a fence or somewhere to dry, so as to allow them to dry as quickly as the flax. These bands could be made from sisal or from long grass. A considerable loss of material would ensue if the flax has got to be tied with flax bands, when something cheaper might be provided.

LIFTING OF FLAX.

If flax has been properly watered it should be fit to lift or take up off the grass on the second day, the weather being dry.

Perfectly dry flax presents the following appearances:—The "shoves" or woody portion should clean out freely when a few stems are rubbed between the hands, and upon looking over it as it lies on the grass, a great many stalks will be found to have a bow and string look with a consequent bending of the stalks due to contraction of the fibre. When these signs are apparent, it is a fairly sure sign that watering has been properly done.

The lifters, commencing at the end of the field where the spreaders finished off, and each one standing at the root end of the flax he is lifting, take a row from right to left of the field, lifting or gathering the flax with the right hand, and letting the left hand lie on the bundle as it is gathered. Those practised at work for a little, can move along very smartly, but great care must be taken to keep the flax even at the root ends. One lifter is able to keep two boys binding. The flax is bound into beets of about nine inches in diameter, with bands that are perfectly dry. As the lifting proceeds, the flax should be carted under cover to a barn or shed, or built into stacks. If wet weather does not permit the lifting to take place at the proper time, and there is a danger of the flax becoming soft or bleached, it should be taken up, even wet as it is, and set up in conical heaps—or "Chapelles"—and a band put around the tops to prevent the wind from blowing it down. In this way it receives very little injury from the wet weather, as the air passing freely through it dries it very quickly. In showery weather, it should be attended to between the showers, and bound up and secured as soon as it is found dry.

BREAKING.

This operation is best performed by a set of patent breakers. These vary in class and size and the quality of the work they are capable of turning out. They are made in five, eight, and ten pair sets according to the size of the factory, or the amount of straw required to be broken, and consist of fluted rollers between which the handfuls of flax are passed. One time through is sufficient for flax if properly retted. The rollers are geared with side shaft and bevel-gears, also fitted with levers and weights to add pressure if required. In breaking the straw, it is essential that the roots all pass between the rollers evenly together.

With a five-pair set of these rollers, from four to five tons of straw can be broken in a day. This set will be found to be most suitable in this country, as the flax is much easier broken than in Ireland, and no skill is required in the operators beyond the ordinary intelligence of the A'kikuyu who, in a very short time, become expert in the manipulation of this part of the machinery.

After the flax has been passed through in small handfuls, one boy is required to take up the flax at the delivery table, and place it down in bundles on the floor, taking care to keep it straight and even. These bundles of broken flax are carried

back to the strickers, as all flax, after breaking, should be stricked—that is, made into small "stricks" for the scutchers. A "strick" of flax is as much flax as one man can grasp in one hand, arranged evenly by pulling out both ends properly and giving it a slight twist.

This is a system that has not been adopted in some parts of the Protectorate, but, where it has been adopted, it is found that the percentage of flax fibre is increased and the percentage of tow lessened. It is also a great advantage to the scutchers as they lose no time in preparing their own handfuls, and the amount of fibre turned out will be almost double.

SCUTCHING MACHINERY AND SCUTCHING.

Up to the present time most people have been carrying on with a Belgian type of machinery, introduced a few years ago and now made locally, which consists of shafting and scutch rims—or wheels as they are sometimes called—spaced on the shafting three feet apart, each one taking twelve blades. My objections to these are that they are too lightly made up, and they are also very springy, and the blades used for same being troublesome and difficult to keep running true.

At the present time Messrs. Lamberts, Limited, Nairobi, are making improvements by casting a type of scutch rim of much the same pattern as the Irish. These rims will be two feet six inches in diameter, and made from cast metal, weighing from 90 to 100 lb. each. They are made to carry Irish scutch blades, each scutch rim requiring six scutch blades, which can be made from local timber suitable for the purpose. These blades should be two feet long, nine inches broad, and one or one and a-half inches thick, with one of the edges planed away to the required thickness. The scutching stocks, or uprights, are so placed that the scutch blades as they revolve pass near the surface, in which is an opening, at the level of the shaft, where the boy inserts the flax to be scutched. The clearance between the upright and the revolving blades is about half-an-inch.

The rims, when fitted with these blades, can be made to five, five and a-half, or six feet diameters, and make from 150 to 250 revolutions per minute. They should be covered in to prevent dust and accident.

I feel certain that the above-mentioned weighty rims and blades will give satisfactory results, and they will be much firmer, stronger, and less stringy, and will work for a long time without replacing.

SCUTCHING OF THE FLAX.

This operation takes place after the flax has been passed through the breakers and been carefully "stricked." To perform this work, it is necessary to have good boys, and the best method is to give each boy a scutch stock of his own to do his particular part of the work; working the boys in pairs, let one boy do the first turn of rough scutching, taking away all the coarse tow, and passing it on to his partner to do the finishing of the fibre. By this method all the coarse tow, and all the fine tow are kept separate. The latter does not require the same amount of scutching as the coarse tow. As the scutch blades rotate, the operator takes the strick of flax in the left hand, holding it a little nearer the tops than the roots, and feeds it evenly and gently into the revolving blades, care being taken not to give one portion too much, and another portion too little. It is advisable not to allow the scutch boys to work with a large handful of flax, as it is severe on the flax. They will do more work with the small handfuls, and keep them neater and much evener in the ends.

After scutching, the flax should be dressed by hand removing all the remaining tow, giving each handful a slight twist, and putting it in a box to be tied up into bundles of about 14 lb. each. Flax has now been brought to that stage in which it is ready for the market, but, if one can afford storage in a dark, cool place, flax keeps in such a place, and will improve in softness of texture. It must not, however, be allowed to get damp.

HACKLING.

In some parts of this country this practice is carried out, and I don't quite agree with it, because the process of hackling is the business of the spinner, and requires skilled labour to do it properly. An inexperienced hackler will waste a large percentage of good fibre, and, in a good many cases, this fibre will command no higher a price than the unhackled. For this reason flax-growers should aim simply to remove the "shove" or bone, and leave the fibre as whole and as long as possible.

TREATMENT OF TOW.

The tow, especially the coarse sorts, must be scutched over again before it can be used for spinning. It is gathered into bundles of about 7 lb. weight, and well shaken and given a slight twist. It is then ready for running through the

mill, and, by repeated turnings and shakings, it is scutched free of all the remaining shoves or woody matter. Tow, for shipping, must be scutched very clean so as to command a high price in the home market.

It does not pay to ship tow not properly cleaned.

Although, undoubtedly, a critical crop to manage, and requiring the greatest care in manipulation while passing through its many stages, yet, it is to be hoped that, by strict attention to the foregoing plain instructions—which may be relied on as the result of long and extensive practical experience—few can fail to be successful and none need fear to undertake the cultivation of flax.

COTTON: THE EGYPTIAN VARIETY.

It is claimed by Gerald C. Dudgeon, Consulting Agriculturist to the Ministry of Agriculture, Egypt, that Egyptian cotton holds its high position in the world's markets by reason of the combined qualities of fineness, strength, and length which its staple possesses in comparison with that of cotton from other parts of the world.

The climatic and cultural conditions found in Egypt afford the country unique advantages, as far as it is at present known, with respect to the production of the particular kinds of cotton possessing the abovementioned valuable qualities.

Attention is directed to the fact that the life of any variety of cotton in Egypt extends for a few years only, such life being determined by the length of time occupied in the variety becoming so impure that its characteristic advantages are no longer apparent. This loss of purity, which by depreciation in value has frequently rendered the position of the Egyptian cotton industry precarious, has led to the introduction from time to time of new varieties showing improved qualities in comparison with the varieties which have declined, and which they are destined to replace.

These new varieties, in their turn, for want of proper control, proceed to deteriorate in the same manner as soon as their cultivation becomes extensive.

(1) Egypt has, so far as at present determined, unique advantages for the production of a special kind of cotton of high value. Attempts are being made in India and Arizona to emulate Egypt's success in this respect, and attention is drawn to the progress made in America to be regarded as a warning of what may happen if steps be not taken to maintain the purity of the existing Egyptian commercial varieties in this country.

(2) The period of life of an Egyptian commercial variety is not long, owing to the fact that the characteristic qualities which constitute its value are usually rapidly broken down by cross-fertilisation in the field and by careless mixture of seed in the ginneries.

(3) The origin of all Egyptian commercial varieties appears to have been a single plant in each case. These plants may be assumed to have been "mutant" strains, the nature of which, so long as they are each inbred, is to breed true to the parent type. The theory of the commercial varieties being ever-splitting hybrids is therefore apparently untenable. The assumption of the mutational origin of Egyptian commercial varieties is supported by what has been found to occur in experimental breeding from Egyptian seed in Arizona.

(4) The inducement for certain cultivators to select single and remarkable plants in order to propagate new varieties has arisen from a desire for money-making, but this advantage is only coincident with the retention of a monopoly of the seed. Impracticability of keeping this has resulted in the deterioration of the variety as soon as control was lost.

The Egyptian Government's attempts to fix and maintain the purity of existing types are faced with the same fate when the purified seed becomes widely distributed.

(5) Examples are given of the introduction of locally undesirable types of cotton into areas otherwise confined to the cultivation of one special kind; and of the injurious irregularity introduced into the seed for sowing by the fraudulent admixture of two totally different varieties of cotton in the operation of ginning. A statement is made of the success which has attended the efforts of the Egyptian Ministry of Agriculture in the isolation of a purified type of cotton, which has yielded from 620 to 906 lb. of ginned cotton per acre in the last year, and of which samples have been pronounced by buying experts in Alexandria to be of excellent quality.

Attention is drawn to the fact that, in the process of the dissemination of the descendant from the purified type, it must, under present circumstances, become impure, necessitating the incessant selection each year of a new nucleus, in order to overcome the establishment of the inevitably deteriorated descendants.

GRAIN FOR SALE.

(All Previous Lists Cancelled).

SEED MAIZE.

To growers desirous of obtaining a pure and reliable strain of improved seed, the following variety is being offered and represents a limited stock raised from a selected strain of Departmental seed:—

Yellow.—Improved Yellow Dent.

CONDITIONS OF SALE.

Applications for seed, with accompanying remittance (exchange added) should be addressed to the Under Secretary for Agriculture, Brisbane. *(Postal address and name of railway station should be given.)*

Sales are limited to three bushels to any one applicant.

Advice will be sent when seed is despatched.

Purchasers are requested to write promptly after receipt of seed should any matters require adjustment.

PRICES.

To enable applicants living at a distance to benefit, a flat rate of 15s. per bushel is being charged. This price includes all railage to the nearest railway station, but where steamer freight is necessary this and any charges in relation thereto must be paid by the purchaser, and the cost thereof added to the remittance.

Fifteen shillings (15s.) per bushel.

DESCRIPTION OF THE ABOVEMENTIONED VARIETY OF SEED MAIZE FOR SALE.

Improved Yellow Dent.—This is perhaps one of the best known and most extensively grown variety in this State. Numerous strains are met with in nearly all districts, all more or less emanating from the original "Yellow Dent." This variety has for many seasons undergone considerable improvement, and a type suitable to meet many of the State's requirements is now being offered. "Improved Yellow Dent" may be classed as a medium-late maturing variety, from five to five and a-half months, a strong, prolific grower, from 10 feet to 12 feet high, capable of giving large returns both of grain and fodder. The ears are of medium size, 8 inches to 10 inches, stout, cylindrically shaped, borne somewhat high on the stalk, semi-erect in habit, being well protected by a strong, tight, close-fitting husk; they are usually well filled, carrying from 16 to 18 rows of grain packed on the cob. The grain is of a rich amber colour, with a yellow tip cap; of medium hardness, and of a deep, flattened wedge-shaped appearance. The core is usually of a pink colour. This variety adapts itself readily to varying conditions, and has given splendid returns in many of the maizegrowing districts.

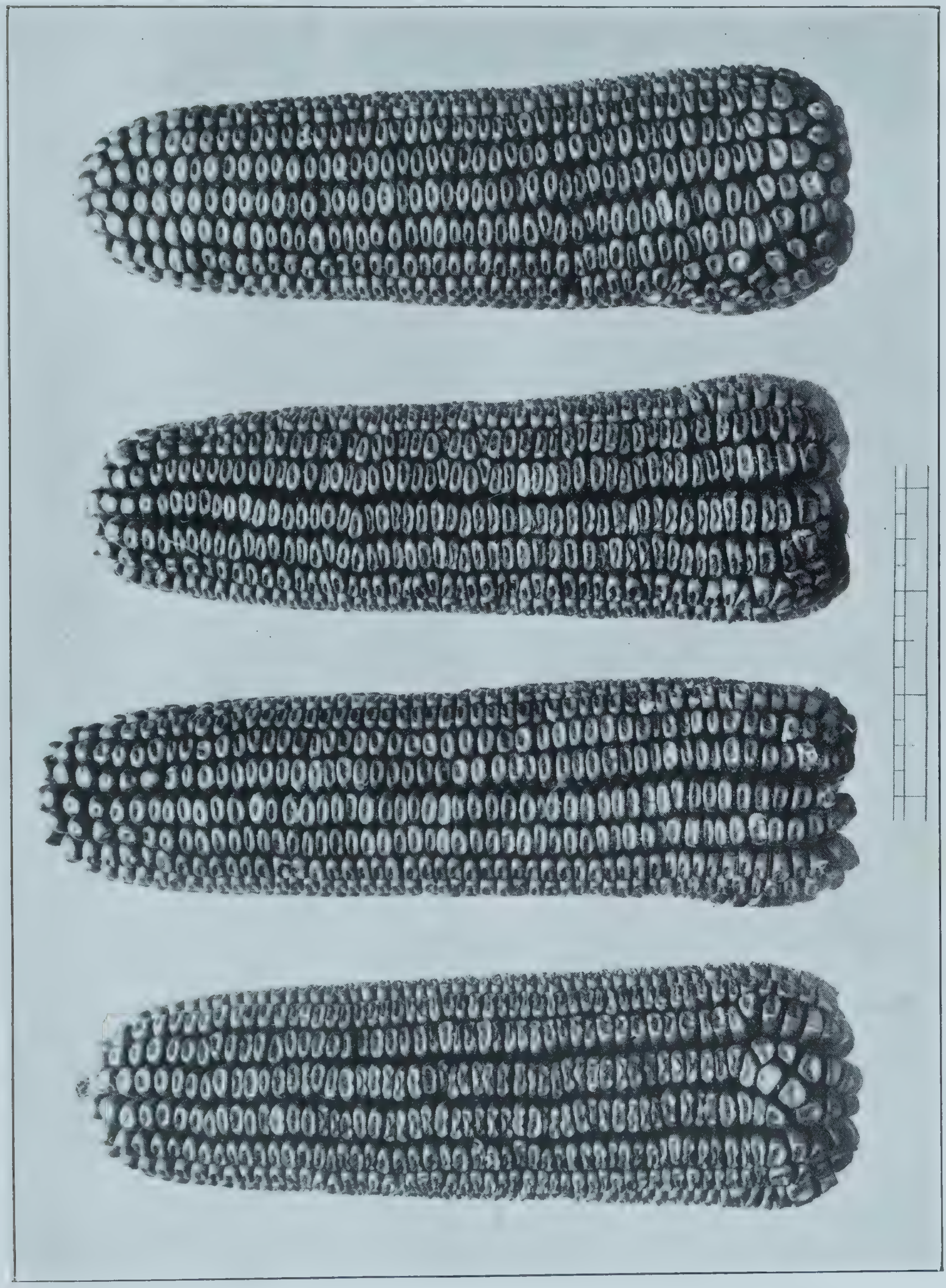

Plate 19.—Improved Yellow Dent.

Improved Yellow Dent.

Plate 20.—Seed Maize.

A FEW PRINCIPLES TO BE OBSERVED IN COTTON-GROWING.

1. When preparing the land, plough deeply—twice, if the land is stiff.

2. Plant three or four seeds in each hole, and cover not more than 1 inch deep. Plenty of seed should be used, as they help each other to break through a hard crust caused by rainstorms and subsequent drying winds.

3. As caterpillars like the young plants until they are a month old, let them have plenty, and the farmer will have enough to do to attend to the one plant per hole which is to produce the crop.

4. Earth up the plants well, up to the first joint, and even more.

5. Run the horse-hoe between the rows at least three times; the plants will then take care of themselves.

6. Should the cotton worm appear, plant a couple of rows of maize between every six or eight rows of cotton. This is the worm which is frequently found in corn cobs. It prefers corn to cotton, and the moth producing them will lay its eggs on the corn plant. When that occurs, cut down and burn the maize, or use it for ensilage. In planting this trap crop, care must be taken to have it tassel about December, and it must therefore be planted considerably later than the normal time of planting in spring.

7. Note that cotton is really a six to seven months' crop, although some varieties are very early. Uplands cotton takes, from seed to flower, from eighty to ninety days, and from flower to boll, seventy to eighty days.

8. After picking, the cotton should be spread out in the sun on tarpaulins or stretchers to dry thoroughly and harden the seed.

Pastoral.

IN-BREEDING.

In the issue of this Journal for June, 1916, we published an article on in-breeding by the writer of Poultry Notes in the Rockhampton "Morning Bulletin," in which he opened up a theory on in-breeding in the case of poultry and other stock, which, however contrary to the opinion generally held by breeders—viz., that in-breeding is a cause of the deterioration of farm stock—is yet a theory which has received practical proof in many countries. He dealt mainly with poultry, but his deductions apply equally to other animals, wild and domesticated, as, for instance, the bison of North America, the Chillingham cattle in England, the buffalo of Northern Australia, the reindeer, Polar bear, the Australian dingo, and a host of other animals in all parts of the world—all instances of in-breeding without deterioration.

This article we submitted to Mr. Cuthbert Potts, Principal of the Queensland Agricultural College, and an acknowledged authority on stock-breeding, who replied that the principles set out in it are quite correct, and he agrees with the writer up to a certain point. All good strains of the various breeds, in fact, the various breeds themselves, have been developed by close in—or line—breeding. It is the only legitimate procedure to adopt. In-breeding, however, he remarked, doubles up weak characters even as strong. On this account, it is a dangerous method to adopt unless the breeder is a very keen judge, and has a good knowledge of his subject. This, probably, largely accounts for the fact that in-breeding is looked on with disfavour. The subject is a very large one and might form the basis of a series of articles in the Journal.

The correspondent who forwarded us the "Morning Bulletin" containing the article said: "If that doctrine is true, then it is a pity it is not known all over the world, and would save a lot of money to breeders of all sorts of stock. If it is not true, then it is a pity that any paper widely distributed amongst farmers, advocates it."

Mr. W. G. Brown, Instructor in Sheep and Wool, Department of Agriculture and Stock, gave us the following note on in-breeding which corroborates the doctrine enunciated in the article. He said: "There is no sheep stud of any value in the Commonwealth which does not use the line system of in-breeding. It is very many years, for instance, possibly fifty years, since an out-cross has been used in the Wanganella (Riverina) Merinos. It is certain that no fixed type in stock can be made without intelligent "line" or "in-breeding."

We reproduce the article from the "Bulletin," with the object of opening a way for discussion of the subject.

"How many breeders are there in the 'fancy' to-day who have not at some stage of their experience received definite instructions from customers when forwarding fowls to exercise care in supplying male and female unrelated? The majority of novices issue these instructions, not because from their experience they have proved close relationship in poultry-breeding unsatisfactory in practice, but because it appears to be an accepted fact that no beneficial results can accrue from such a policy. This idea is as widespread as it is erroneous, and will take many years to overcome to any appreciable extent. It has risen in most instances through want of knowledge, and has been to some extent encouraged by many experienced breeders, who, aware of the increased opposition they would have to encounter in competition were in-breeding more generally resorted to, advise the novice in every instance to secure unrelated blood when purchasing a breeding-pen, well knowing that this is the best system whereby to deprive him of the opportunity of achieving satisfactory results.

"So far as can be ascertained, the chief objection raised against in-breeding is that it destroys the fertility and stamina of the stock and results in deformed specimens being produced. That these serious defects are apparent in many instances can readily be endorsed, but that they are due solely to in-breeding is a matter of very grave doubt. Weedy specimens occur in numerous instances in which relationship between the parents is as distinct as the poles, comparatively speaking, so it can be safely attributed to other causes. On the other hand, some of the best show birds that have ever been penned—perfect giants of their race—have been the result of a union between brother and sister for the third successive generation.

"As illustrating the extent to which consanguineous matings can be carried without injurious effects resulting, the case of the ordinary blue pigeon may be cited. A pair of these birds will in a few years found a flock of several thousands,

all bred from the closest possible union; each pair, when able to provide for themselves, taking up their share of the duty of increasing the flock and continuing it for several generations on precisely similar lines. It can be asserted without the slightest fear of contradiction that the keenest scrutiny would fail to detect the slightest difference in size, health, and stamina between one of the original stock and one of, say, the tenth generation. Further illustrations, such as the various native birds, dingoes, rats, and rabbits, can be referred to as proving that in-breeding does not affect the stamina of progeny of closely related parents. Incestuous breeding amongst all the abovementioned is notorious, yet it would require a bold opponent of in-breeding to say that either of the two latter, at any rate, have forfeited any of their vigour, or have decreased in size in comparison with their progenitors of recent decades.

"A solution of the problem appears to be in the fact that many breeders, through careless methods rarely keep their birds in sufficiently good health to ensure vigorous offspring, yet they attach the whole of the blame to the birds by inferring that their want of success was entirely due to the fact of the birds being in-bred. In quite 90 per cent. of the cases wherein the growing stock shows signs of inherited constitutional weakness, it can safely be attributed to neglect on the owner's part by breeding from immature stock, from birds inheriting some serious disease, or from specimens so overburdened with internal fat that their system has become impaired to such an extent that expecting healthy progeny from them was a folly.

"All the above are factors operating against successful results being obtained, no matter whether in-breeding has been resorted to or not, but from birds of a suitable age, and kept in good, clean healthy condition, sound, vigorous stock can always be relied on, even though the closest relationship has existed for unlimited generations. Expert breeders, especially those who rely on poultry-breeding for the whole or greater portion of their income, are fully seized of the fact that in-breeding must be practised to a very pronounced extent if anything approaching permanent success be aimed at. They accordingly, when laying the foundation of their strain, take steps to secure their stud birds from a reliable breeder and insist on having them closely related. The resultant progeny from such show a uniformity of quality that is really surprising and, by the selection of the best specimens to make back to the parents—that is, the pullets to their sire and a cockerel to his mother—the ensuing result is highly satisfactory. In-breeding thus is only advocated, however, when some special quality is desired, and at least one of the birds bears evidence of possessing it. It would be obviously unwise to mate two birds that were closely related, each possessing a decided fault, and expect them to produce perfect stock. It follows, as a matter of course, that every point or feature is strongly impressed by each successive generation. Hence imperfections are intensified equally with desirable qualities where line breeding is adopted, provided the stock have a tendency in that direction. It is advisable, therefore, for the breeder at all times to make himself thoroughly acquainted with the standard requirements of the varieties he fancies, and, when such instruction is thoroughly mastered, its adoption should be aimed at by the most careful selection and making up of stock showing the nearest approach to perfection in the greatest average of points. If sound judgment be brought to bear upon the matter, it will prove a comparatively easy task, for, by judicious in-breeding many points can be fixed in a remarkably short space of time, and a strain can thus readily be brought to within measurable reach of perfection.

"Convincing proof of the advantages of in-breeding lies in the fact that many of the most successful fighting game breeders in England have bred and fought their strains of birds for over twenty years without the introduction of fresh blood into their stock. When this can be accomplished successfully with a breed requiring the strength and courage necessary for pit fighting, it will be readily conceded that nothing but beneficial effects would result from similar lines applied to utility stock.

"It will be unhesitatingly acknowledged by every experienced breeder that a variety of fowl possessing distinctive characteristics can be relied on when bred in line for several years to impress the same qualities on their progeny in a very decided manner. Therefore, it can be most emphatically asserted that in-breeding introduced for any definite object, such as egg production, table properties, or special show points, can be depended upon to achieve most satisfactory results, for not only the energy of the parent stock, but also that of the grandparents and still more remote ancestors, is concentrated in one direction, and thus speedily achieves by prepotency a result that would take years to obtain where fresh blood is continually introduced.

"The majority of amateurs, when embarking in the venture of pure-bred poultry-keeping, generally secure a setting of eggs with which to make a beginning. Such is an excellent plan, and can be strongly recommended when a reliable breeder is selected from which to obtain same. When these chicks are hatched, being more prized than ordinary stock, they receive extra attention and more liberal feeding,

generally on unsuitable and highly stimulating foods that play havoc with their digestive organs and render them wholly unfit to undertake the task of propagation of their species. It is the mating of such birds, together with the consequent disastrous results obtained from them, that has given rise to the cry that in-breeding is injurious; but surely any unbiassed individual must know that birds pampered to an unusual extent must always prove unsatisfactory, no matter whether bred from closely related stock or otherwise? As before stated, lack of vitality is the root of the failures extending over the breeding season.

"In-breeding, therefore, cannot be carried too far, provided always that due attention be paid to the general health and vigour of the stud birds. It is on this point that nature teaches us a most valuable lesson, for, with in-breeding as with other details, she vigorously insists on that admirable law being strictly observed—namely, the survival of the fittest."

In September last, a writer (Halcyon) in the "United Graziers' Journal" wrote as follows on—

IN-AND-IN BREEDING IN RACEHORSES.

In referring to in-breeding in these columns, from time to time, little or no mention has been made of horses in this connection; reference to sheep and cattle has been the invariable rule. On this occasion I will break fresh ground and introduce it as affecting the thoroughbred horses.

It is only too well known to those who know the thoroughbred horse, which is the most symmetrical, and the swiftest animal in the world, that it is greatly in-bred. From an early period in the history of the racehorse its breeders were fully alive to the value of pedigree, and it has always been considered to be considerably in a colt's favour if he should possess in his pedigree the union of several strains of one line of stout running blood.

Britain, of all European nations, was the first to realise the value of pedigree, but in the deserts of Arabia its value in breeding horses was known at a very early date of the world's history, and, consequently, purity of blood was held by them in the highest estimation.

THE BEDOUIN ARAB HORSES.

The Bedouin Arabs possessed five superb breeds, viz., the Kehilan, Leglawi, Abeyan, Hamdan, and the Hadban. The Kehilan was the fastest though perhaps not the hardiest of those five breeds. It should be carefully noted, though, that they bore a very close resemblance in appearance to our present day racehorse. The Darley Arabian, perhaps the only thoroughbred Anizeh horse in the English Stud Book, was a Kehilan type of horse, which traced his pedigree through the sub-breeds, K. Angus, and K. Rus-el-Fe-dawi.

Then again that popular Godolphin Arabian was derived from an outside breed named Jinfan, through the sub-breed, J. Stam-el-Bulad. To prove this fact Omar Pasha took great pains.

As an illustration as to the way English racehorses have been bred, the following dictum of the late Dr. Bathe, who was a great authority on pedigrees of celebrated racehorses, must have great weight. He said: I do not think a better example can be found of excellence, both on the turf and at the stud (the latter being proven through so many generations) than the one that has been called the 'Ace of Trumps' of the Stud Book, viz., Waxy. In this notable animal there was a concentration of good blood. On his sire's side, he was a direct descendant from the Darley Arabian—the fountain head from which our English thoroughbred horse takes its excellence—as his sire, Potsos, was a son of Eclipse, and Eclipse was a grandson of Squirt, who was a grandson of the Darley Arabian. Another strain of the Darley Arabian blood came in on Potsos' dam's side. On Waxy's dam's side the Darley Arabian was returned to by several strong infusions. Maria had two strains of his blood, one of them by Blaze, son of Flying Childers, son of the Darley Arabian—and her dam, Lizette, had also two strains of his blood by her sire, Snap, who was a grandson of Flying Childers.

Another notable instance of in-breeding was Blue Gown, winner of the 1868 English Derby. His sire, Beadsman, came from a union of the Joe Andrews and Waxy lines. Beadsman was by Weatherbit, who united the lines of Joe Andrews and King Fergus. Miss Letty, Weatherbit's dam, was closely related to Orville, great grandson of Eclipse, on the side of both sire and dam. Beadsman's dam, Mendicant, inherited the same blood, through Waxy on her sire's side and Joe Andrews on her dam's side. Blue Gown got a double infusion of the Darley Arabian blood through his dam, Bas Bleu.

The English Stud Book gives numerous illustrations of in-breeding, but what has here been given should be ample to show the mode of breeding adopted by most owners of thoroughbred studs.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1919.

The conditions have again been favourable for egg production. The nights have been mild and the weather generally satisfactory. Rain is badly needed for producing the ever-necessary green feed. At the present time milk thistles are being used, there being no green lucerne available. The health of the birds has been excellent. One death occurred during the month in C. H. Singer's pen, and the bird has been replaced. The following were the highest individual scores:—In Black Orpingtons, birds belonging to R. Holmes, E. M. Larsen, and R. Burns laid 31 eggs in the 31 days, R. Holmes also having two birds which laid 30 each. In White Leghorns, J. M. Manson and T. Fanning each had a hen which laid 28 for the month. Ferguson's C. Langshan laid 27, whilst the A. and F. Barred Plymouth Rocks of the Kelvin P.F. laid 28 and 27 respectively. We omitted to mention in the July report that the score of these Plymouth Rocks probably constitutes a record for that breed's laying. T. Fanning's pen gained the highest aggregate for the month in light breeds and R. Holmes in heavies. The following are the individual scores:—

Competitors.	Breed.	August.	Total.
	LIGHT BREEDS.		
*J. M. Manson	White Leghorns ...	155	643
*W. Hindes	Do.	147	628
*T. Fanning	Do.	156	608
*Dixie Egg Plant	Do.	135	601
*E. A. Smith	Do.	145	573
*Dr. E. C. Jennings	Do.	141	558
*G. W. Hindes	Do.	140	552
*Haden Poultry Farm	Do.	136	551
*Range Poultry Farm	Do.	133	531
S. McPherson	Do.	129	531
*Quinn's Post Poultry Farm	Do.	141	510
J. H. Jones (Toowoomba)	Do.	137	504
G. Williams	Do.	136	504
*C. P. Buchanan	Do. ...	131	503
G. J. Byrnes	Do.	121	502
*H. Fraser	Do.	137	495
*B. Caswell	Do.	134	492
*W. Becker	Do.	138	487
W. A. Wilson	Do.	133	470
S. W. Rooney	Do.	122	470
H. A. Jones (Orallo)	Do.	126	467
*L. G. Innes	Do.	145	465
*Mrs. L. F. Anderson	Do.	137	456
*J. J. Davies	Do.	137	454

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
	LIGHT BREEDS—*continued.*		
*W. Lyell ...	White Leghorns	118	454
*Mrs. R. Hunter ...	Do.	112	428
*Mrs. A. G. Kurth	Do.	138	424
*Thos. Taylor	Do.	139	417
G. H. Kettle	Do.	120	415
Geo. Trapp	Do.	116	408
H. O. Jones (Blackstone)	Do.	124	390
B. Chester	Do.	123	390
Oakleigh Poultry Farm ...	Do.	110	389
Mrs. N. Charteris...	Do.	113	382
C. A. Goos	Do.	122	381
*O. W. J. Whitman	Do.	127	365
R. C. J. Turner ...	Do.	107	362
N. A. Singer	Do.	130	344
J. H. Dunbar	Anconas ...	107	337
J. W. Newton	White Leghorns	121	336
W. Morrissey	Do.	111	335
	HEAVY BREEDS.		
*R. Holmes	Black Orpingtons	167	711
*R. Burns ...	Do.	158	627
*E. M. Larsen	Do.	145	626
*E. F. Dennis	Do.	156	619
Geo. Nutt	Do.	146	614
*A. E. Walters	Do.	146	598
*W. Smith	Do.	162	586
*A. Shanks	Do.	150	578
*Kelvin Poultry Farm	Plymouth Rocks	147	576
*E. Morris	Black Orpingtons	143	559
*Nobby Poultry Farm	Do.	136	540
*D. Fulton...	Do.	124	532
*Jas. Ferguson	Chinese Langshans	126	503
*T. Hindley	Black Orpingtons	146	484
*H. Puff ...	Rhode Island Reds	116	478
*W. H. Reilly	Chinese Langshans	119	475
Burleigh Pens	Black Orpingtons	133	445
*Mars Poultry Farm	Do.	145	433
A. Homan ...	Do.	108	421
*T. B. Barber	Do.	121	400
*F. W. Leney	Do.	130	396
R. B. Sparrow	Do.	142	379
C. H. Singer	Do.	84	352
J. A. Cornwell	Do.	102	345
A. Gaydon	Do.	115	317
H. Ashworth	Do.	127	310
Total ...	...	8,824	32,016

* Indicates that the pen is engaged in single hen test.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	107	102	110	110	106	108	643
W. Hindes	118	109	102	91	104	104	628
T. Fanning	112	83	102	108	98	105	608
Dixie Egg Plant	93	94	111	116	91	96	601
E. A. Smith	90	89	111	94	85	104	573
Dr. E. C. Jennings	96	72	97	94	90	109	558
G. W. Hindes	103	78	106	92	83	90	552
Haden Poultry Farm	103	103	99	89	72	85	551
Range Poultry Farm	67	91	105	107	71	90	531
Quinn's Post Poultry Farm ...	77	92	103	96	73	69	510
C. P. Buchanan	68	101	80	76	84	94	503
H. Fraser	60	89	101	84	70	91	495
B. Caswell	69	28	86	108	114	87	492
W. Becker	112	90	103	67	35	80	487
L. G. Innes	53	96	60	87	91	78	465
Mrs. L. Anderson	84	96	60	66	66	84	456
J. J. Davies	63	64	83	85	88	71	454
W. Lyell	64	93	92	69	68	68	454
Mrs. R. Hunter	67	74	80	75	69	63	428
Mrs. A. G. Kurth	95	75	84	69	37	64	424
Thos. Taylor	88	51	48	91	89	50	417
O. W. J. Whitman	52	85	55	52	64	57	365
HEAVY BREEDS.							
R. Holmes	121	125	131	108	133	93	711
R. Burns	106	98	106	133	86	98	627
E. M. Larsen	110	120	102	94	114	86	626
E. F. Dennis	120	81	116	104	77	121	619
A. E. Walters	101	102	112	95	80	108	598
W. Smith	67	117	95	88	122	97	586
A. Shanks	59	69	119	108	103	120	578
Kelvin Poultry Farm	126	83	82	80	108	97	576
E. Morris	97	96	95	97	116	58	559
Nobby Poultry Farm	77	83	77	97	105	101	540
D. Fulton	97	90	96	80	92	77	532
Jas. Ferguson	97	109	68	72	78	79	503
T. Hindley	110	96	48	87	73	70	484
H. Puff	94	54	83	102	71	74	478
W. H. Reilly	70	62	93	97	74	79	475
Mars Poultry Farm	53	103	104	39	41	93	433
T. B. Barber	59	78	64	68	79	52	400
F. W. Leney	54	66	81	106	39	50	396

The following are the winners of the four months' Winter Test:—

LIGHT BREEDS.

J. M. Manson ... ... 418 eggs; average weight 2 oz.
W. Hindes ... ... 481 ,, ,, 2 ,,
Dixie Egg Plant ... ... 466 ,, ,, 2 ,,

HEAVY BREEDS.

R. Holmes ... ... 544 eggs; average weight 2 oz.
R. Burns ... ... 469 ,, ,, 2 ,,
A. E. Walters ... ... 452 ,, ,, 2 ,,

WEIGHT OF EGGS, SINGLE PENS.

—	A.	B.	C.	D.	E.	F.	Pen Average.
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
LIGHT BREEDS.							
Mrs. Anderson	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
Haden P. Farm	$1\frac{7}{8}$	$2\frac{1}{8}$	2	2	$2\frac{1}{4}$	2	2
Harold Fraser	$2\frac{1}{4}$	2	$2\frac{1}{8}$	$1\frac{7}{8}$	2	2	2
Dr. Jennings	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$
Range P. Farm	$2\frac{1}{8}$	$2\frac{1}{4}$	2	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2
Thos. Taylor	2	$1\frac{7}{8}$	2	$1\frac{7}{8}$	$1\frac{7}{8}$	$2\frac{1}{8}$	2
B. Caswell	$2\frac{1}{4}$	$1\frac{7}{8}$	$2\frac{1}{8}$	$1\frac{3}{4}$	2	$2\frac{1}{8}$	2
Dixie Egg Plant	$1\frac{3}{4}$	$2\frac{1}{8}$	2	2	$1\frac{7}{8}$	2	2
J. M. Manson	2	$2\frac{1}{4}$	2	$1\frac{3}{4}$	2	2	2
L. G. Innes	$2\frac{1}{8}$	$1\frac{3}{4}$	2	2	$2\frac{1}{8}$	2	2
T. Fanning	2	2	$1\frac{7}{8}$	$1\frac{7}{8}$	2	$1\frac{7}{8}$	$1\frac{7}{8}$
J. Davies	$2\frac{1}{8}$	2	$2\frac{1}{8}$	$1\frac{7}{8}$	$1\frac{7}{8}$	2	2
W. Becker	$1\frac{7}{8}$	2	$1\frac{7}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$	2
Quinn's Post P. F.	$2\frac{1}{8}$	2	2	$1\frac{3}{4}$	$2\frac{1}{8}$	2	2
O. W. Whitman	$2\frac{3}{8}$	2	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{4}$
G. W. Hindes	$2\frac{1}{4}$	2	2	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
Mrs. R. Hunter	2	2*	2	$1\frac{7}{8}$*	2	2	2
W. Hindes	2	2	$2\frac{1}{4}$	2	2	2	2
W. Lyell	$1\frac{7}{8}$	2	2	2*	$1\frac{7}{8}$	$2\frac{1}{4}$	2
Mrs. A. G. Kurth	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{4}$	2	$2\frac{1}{8}$
E. A. Smith	2	$2\frac{1}{8}$	$1\frac{7}{8}$	2	$1\frac{7}{8}$	$1\frac{7}{8}$	2
C. P. Buchanan	$2\frac{1}{4}$	2	$1\frac{7}{8}$	2	$1\frac{7}{8}$	2	2
HEAVY BREEDS.							
T. B. Barber	2	$2\frac{1}{8}$	$1\frac{7}{8}$	$1\frac{7}{8}$	2	$2\frac{1}{8}$	2
Kelvin P. Farm	2	$1\frac{3}{4}$	$2\frac{1}{8}$	$1\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$
J. Ferguson	$1\frac{7}{8}$	2	$1\frac{7}{8}$*	2	2	$1\frac{7}{8}$*	$1\frac{7}{8}$
A. E. Walters	$1\frac{7}{8}$*	2*	$1\frac{7}{8}$	2	2	2	2
E. F. Dennis	$1\frac{7}{8}$	2	$1\frac{7}{8}$	2	2	$\frac{1}{4}\frac{7}{8}$	$1\frac{7}{8}$
A. Shanks	$2\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{3}{4}$	2	$1\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{7}{8}$
Mars P. Farm	2	2	2	2	$1\frac{7}{8}$	$2\frac{1}{8}$	2
Nobby P. Farm	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{8}$
D. Fulton	2	2	2	2	$1\frac{7}{8}$	$1\frac{7}{8}$	2
R. Burns	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{3}{4}$	$2\frac{1}{8}$	2	2
T. Hindley	$1\frac{7}{8}$	$1\frac{7}{8}$	2	$2\frac{1}{8}$	2	2	2
W. Smith	$2\frac{1}{8}$	2	2	2	$1\frac{7}{8}$	2	2
W. H. Reilly	2	2	2	2	$2\frac{1}{4}$	$1\frac{7}{8}$	2
F. W. Leney	2	2*	$1\frac{7}{8}$	$1\frac{7}{8}$	$2\frac{1}{4}$	2	2
E. M. Larsen	2	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$1\frac{7}{8}$	2*	$1\frac{7}{8}$
E. Morris	$2\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$1\frac{7}{8}$	$2\frac{1}{8}$	2
R. Holmes	2	$1\frac{7}{8}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$1\frac{7}{8}$	2	2
H. Puff	$2\frac{1}{8}$	$2\frac{5}{8}$	$2\frac{3}{8}$	$2\frac{1}{4}$	$2\frac{1}{4}$*	$2\frac{3}{8}$	$2\frac{1}{4}$

The individual averages are obtained from the weights of six eggs. Cases where less than six eggs have been weighed are marked *. The pen average is taken from the whole 36 eggs. As each average is given to the nearest $\frac{1}{8}$ oz., the pen average is not necessarily the average of the individual averages. Examples:—

—	A.	B.	C.	A.	B.	C.
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
	2	2	$1\frac{7}{8}$	2	2	$1\frac{7}{8}$
	2	2	$1\frac{7}{8}$	2	2	$1\frac{7}{8}$
	2	2	$1\frac{7}{8}$	2	2	$1\frac{7}{8}$
	2	2	$1\frac{7}{8}$	2	2	$1\frac{7}{8}$
	$1\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2
	$1\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2
Average to nearest $\frac{1}{8}$ oz.	2	2	$1\frac{7}{8}$	2	2	$1\frac{7}{8}$
Average of 18 to nearest $\frac{1}{8}$ oz.		$\frac{7}{8}$ oz.			2 oz.	

GROUP PENS.

—	Average Weight of Eggs.	Variation.
LIGHT BREEDS.		
W. Morrissey	$2\frac{1}{8}$ oz.	$1\frac{7}{8}$ to $2\frac{1}{4}$ oz.
J. W. Newton	2 ,,	$1\frac{3}{4}$ to $2\frac{1}{8}$,,
B. Chester	2 ,,	$1\frac{3}{4}$ to $2\frac{1}{8}$,,
Chris. Goos	$1\frac{7}{8}$,,	$1\frac{5}{8}$ to $2\frac{1}{8}$,,
H. A. Jones	2 ,,	$1\frac{3}{4}$ to $2\frac{1}{4}$,,
Geo. Trapp	2 ,,	$1\frac{3}{4}$ to $2\frac{3}{8}$,,
J. H. Jones	2 ,,	$1\frac{7}{8}$ to $2\frac{1}{4}$,,
Geo. Williams	$1\frac{7}{8}$,,	$1\frac{5}{8}$ to $2\frac{1}{4}$,,
G. H. Kettle	2 ,,	$1\frac{7}{8}$ to $2\frac{1}{4}$,,
N. A. Singer	2 ,,	$1\frac{3}{4}$ to $2\frac{1}{8}$,,
Mrs. N. Charteris	2 ,,	$1\frac{7}{8}$ to $2\frac{1}{8}$,,
H. O. Jones	2 ,,	$1\frac{3}{4}$ to $2\frac{1}{8}$,,
W. A. Wilson	$1\frac{7}{8}$,,	$1\frac{5}{8}$ to $2\frac{1}{8}$,,
S. McPherson	2 ,,	$1\frac{5}{8}$ to $2\frac{1}{8}$,,
Oakleigh P. Farm	2 ,,	$1\frac{3}{4}$ to $2\frac{1}{8}$,,
S. W. Rooney	2 ,,	$1\frac{7}{8}$ to $2\frac{1}{8}$,,
Geo. J. Byrnes	$1\frac{7}{8}$,,	$1\frac{3}{4}$ to $2\frac{3}{8}$,,
R. J. Turner	$2\frac{1}{8}$,,	$1\frac{7}{8}$ to $2\frac{1}{4}$,,
HEAVY BREEDS.		
Geo. Nutt	$1\frac{7}{8}$ oz.	$1\frac{3}{4}$ to $2\frac{1}{8}$ oz.
Mrs. M. E. Smith	2 ,,	$1\frac{3}{4}$ to $2\frac{1}{8}$,,
R. R. Sparrow	2 ,,	$1\frac{7}{8}$ to $2\frac{1}{8}$,,
H. Ashworth	2 ,,	$1\frac{3}{4}$ to $2\frac{3}{8}$,,
G. H. Singer	$1\frac{3}{4}$,,	$1\frac{1}{2}$ to $2\frac{1}{8}$,,
J. A. Cornwall	$1\frac{7}{8}$,,	$1\frac{5}{8}$ to 2 ,,
A. Homan	$1\frac{7}{8}$,,	$1\frac{5}{8}$ to $2\frac{1}{8}$,,
J. H. Dunbar	$1\frac{7}{8}$,,	$1\frac{5}{8}$ to 2 ,,
A. Gaydon	2 ,,	$1\frac{7}{8}$ to $2\frac{1}{4}$,,

In all groups at least 30 eggs were weighed, and for single pens at least 6 eggs (except in cases marked *) were taken. All results are given to the nearest one-eighth of an ounce.

CUTHBERT POTTS,
Principal.

COTTON-GROWING IN THE WEST.

We have on several occasions received from cotton-growers in various districts of Queensland confirmation of the statement that the cotton plant is a drought resister. The Department has received a fine sample of cotton produced from mixed seed supplied to Mrs. E. Conway, of Mulgalone, Amboola (388 miles on the Western Railway line, Mitchell district), in September, 1917. The first lot sown was badly cut by the frost in October, but later-sown cotton did very well. The winter was very severe, and the first planted old bushes did not sprout again until November. There was no general rain until the 3rd of February, yet many of the bushes ripened their bolls. The cotton sample received by the Department was from the old bushes which survived the frosts. Mrs. Conway states that she is quite satisfied that cotton is one of the most certain and suitable crops for the above district, and has prepared 10 acres for planting on 1st October, and an additional 10 acres to be planted at the end of that month. The varieties of seed asked for are Russell's Big Boll and Sea Island or Mascotte. We shall be glad to hear the results of this planting. Much of the finest Uplands cotton has been grown in the Western districts. We do not expect to hear that Sea Island cotton thrives there as well as it would on the coast, owing to the want of a moist, saline atmosphere; on the other hand, the best results accrue from planting good varieties of Uplands cotton such as Duranga, Russell's Big Boll, Jones's Improved, &c.

The Horse.

ITEMS OF INTEREST FROM OUR EXCHANGES.

FIRST AID TO HORSES.

Fractures.

It is a mistake to imagine that because a horse breaks his leg he is done for, and should be shot. In many cases, with proper and speedy treatment, it will do well, and even if not always absolutely free from lameness, a mare, at all events, is worth breeding from. When a leg is broken, a temporary splint can be made with the aid of a piece of wood and some kind of bandage. This will often enable the animal to be got home, where the limb can be properly set. It is advisable to put horses so injured in a sling as soon as possible. A quite serviceable sling can be made with an ordinary sack, each end of which is turned over a round piece of wood, longer that the breadth of the sack, and sewn firmly. This is placed under the animal's chest, and fastened to the rafters of the stable by means of ropes attached to each end of the pieces of wood. The object of such a sling is not to lift the horse off the ground, but to afford him support and take weight off the injured limb.

What is apparently a broken back is sometimes only a severe injury to the muscles, such as will prevent the animal from getting up. If the back be really broken, the horse will be unable to move its hindquarters and tail, and those parts will be destitute of sensation. A pin will soon show if that is the case. Such an accident is beyond remedy. If, however, the animal feels the prick of a pin, and can move its hinder parts, he should be allowed to lie quietly until expert advice is obtained. With treatment a complete recovery may be made.

Dislocations.

The first thing to be done with a dislocated joint is to reduce it, *i.e.*, to get the parts back into their natural position and to keep them there. This is usually done by extending the dislocated joint and slipping it, either by force or persuasive movement, into its place. If it is one of the lower joints of a limb, a bandage will be necessary after the dislocation is reduced.

Probably the most frequent dislocation is that of the stifle. A simple method of treatment is to pass a rope round the hoof of the affected limb, and pull it forward towards the shoulder while the patella (knee-cap) is pushed forwards and inwards by the hand. It will jump into its place with an audible snap, and the animal be able to move again freely.—"Pastoral Review."

SEA ISLAND COTTON.

A correspondent who intends planting cotton wishes to know what variety will pay best—Uplands or Sea Island. Undoubtedly a good variety of Uplands, such as Durango or Russell's Big Boll, would prove to be the most profitable crop. The long-staple Sea Island variety, although agriculturally and commercially a profitable crop in the West Indies and other tropical countries, has not proved to be so in Southern Queensland, although in the North both that and the Caravonica long-staple cottons have done well. There is no market at Sea Island prices for a large production of this cotton; hence the supply is limited. It commands a higher price than the Uplands cottons owing to its characteristic length and fineness, and is only in demand by spinners for the manufacture of special fabrics. It is most productive on land near the coast, where it gets the benefit of a saline atmosphere.

The Orchard.

PINEAPPLE-GROWING.

By J. ROSE, Comptroller Soldiers' Settlements.

I propose to deal with this matter under three headings—namely, selection and preparation of land; selection of plants; methods of planting and manuring, and methods of cultivation.

With the great expansion that has taken place in recent years in the pineapple-growing industry, a great demand has been created for suitable land for pinegrowing, and the man who to-day wishes to embark in this industry finds himself up against two serious difficulties. Firstly, the high cost of purchasing a good pine garden as a going concern; and, secondly, the fact that most of the land available at the present time in the virgin state is of a very poor description, and it is almost impossible to secure a first-class site with good allround conditions.

Now I propose to keep all these difficulties in view as I proceed with my paper, and if there are those amongst my readers who got in early and secured the ideal ground and situation, my paper is not to you, but rather to the less fortunate.

In recent years a new element has crept into the industry with the advent of the city business man, who has been told that the best way to get rich quickly is to secure a pine farm; but in this way of divided attention the best results have not always been obtained.

It is a most remarkable fact that pines can be grown successfully upon any class of soil, provided there is a good drainage—that is, provided the grower knows his business, studies the wants of the plants, and provides for all deficiencies.

ASPECT.

I will now proceed with selection of site for garden.

There is a prevailing idea that an easterly aspect is of the utmost importance, and I should like to state that, in my opinion, the garden with a variety of aspects is the ideal one, as the grower will thus get an extended season by reason of the fruit varying about a fortnight earlier on the eastern and northern side of the hill to the southern side. There is no doubt whatever about the fact that the east and north aspect give the early fruit, and the south and west the late fruit. I have also found that the steeper the hill side on the southerly aspect, the later the fruit, and this is accounted for by the fact that these rows would run east and west to cross the hill to avoid wash, and fully two-thirds of the plants would fall down the hill and get very little sun.

It is most desirable that the site should be at a good elevation, especially the farther one gets back from the sea coast. Frost is the enemy of the pine, and low levels, with drifts of swampy country leading into them from the west, should always be avoided. For several years there have been very mild winters, but sooner or later we shall have a return of severe frosts, and growers would do well to bear this in mind.

A great deal of protection can be given to pines on low ground in winter by covering the rows with blady grass; but it is most important when this is done that a good covering be put on, as otherwise the damage is increased by reason of frost settling on this covering.

I do not propose to deal with the matter of clearing land, except to condemn the practice of burning huge heaps of logs in the one place, and thereby destroying the value of that portion of the land for many years.

PREPARATION OF GROUND.

We now come to the most important part of the work, and herein, to my mind, lies the result of a great many failures to grow pines successfully.

It must always be borne in mind that the pine is a permanent crop. It continues bearing roughly from six to ten years and much longer in some cases. It is impossible to carry out the deeper methods of cultivation after the planting has been done, and as the years go on and rows grow in, it becomes more difficult to cultivate, and as far as possible all this must be provided for at the initial stages.

Too much stress cannot be laid upon the importance of thorough working of the soil, especially in districts where the soil is of rather a solid nature. At least three good ploughings are required for the following reasons:—There is only a depth of from 3 to 4 inches of soil on the surface that is of any value as far as plant foods are concerned. The pine is certainly a surface feeder, and will confine itself to this depth, or just so far as there is any attraction or conditions are favourable.

Why do we hear so many complaints about pines growing out of the land and falling over? In many cases it is more the fault of the grower than of the plant, and I am quite convinced that the practice of planting pines in badly ploughed land at the bottom of furrows 6 to 9 inches below the surface does not obviate the trouble, but rather increases it. The point I wish to emphasise is the absolute necessity of thorough mixing of the soil down to a depth of about 10 inches, and not more than 12, as the other extreme is just as bad and would result in the turning up of sour subsoil, which would be injurious to the pines. If this method of preparing land is carried out, some of that surface soil which the plant is so fond of will be carried to a depth of 10 inches, and a greater incentive will be set up for the plant to root freely and forage for a living. Loose soils require this process just as much as heavier ones. There is also the benefit of a better drainage where the land is ploughed to a good depth. Too many of our pines are rushed into the land, and the future is lost sight of. I would suggest that at least six months be taken to prepare the land, and where three ploughings are used, that they be not less than one month apart. The value of allowing the soil to enjoy the benefit of contact of sun and air, and the sweetening process that must of necessity follow, are facts that are overlooked by most growers.

PLANTS AND PLANTING.

We now pass on to the question of plants and planting, and I regret time will not permit of my giving the subject of selection of plants all the consideration it deserves, as it is here, in my opinion, that a wide field of possibilities is opened up to the growers of pineapples. In the first place, the indiscriminate planting of anything in the shape of plants, having no regard for physical defects, such as cripples, and more or less barren plants, is a matter for serious thought. Let me observe a grower's method of planting, and the class of plants he puts in, and I will give you the future of that garden, and the grower that walks about and tells the new beginner that any plant will do, and that these defects will grow out in his pines, is the greatest enemy to the industry that it is possible to find. These remarks apply with a great deal more force to rough and Ripley pines than to smooth leaf. The smooth leaf variety is not subject to deformity, but has all the other defects. Bearing in mind every time the future of my garden, the first essential towards this is a low-set row of plants of uniform growth and type, which can only be obtained by the planting of the true suckers about six to nine months old. I am aware that there are those amongst you that will join issue with me on this question, and to those I would say, that these observations are not the results of single rows, but of careful experiments carried out in plots of pines, not less than 5 acres each, of the different class of suckers, and over a period of six to ten years, which is here regarded as the period of usefulness of a pine crop. One of the greatest troubles to guard against is the growth of huge abnormal plants previous to the first bearing, and where this occurs, the utility of this plant is destroyed. In some cases, all the growth will go into slip, and I have seen cases where there has not been a single sucker six months after fruit was cut.

These abnormal growths always produce their suckers from 6 to 9 inches above ground, and the future of that row is a doubtful one.

I admit that there are exceptions, but slips, and tops especially, are undoubtedly more prone to this habit than any other class of plant. Where slips are planted, a great deal of benefit is derived if these plants are put out thickly in a nursery for about six or nine months, and then removed to their permanent home. In this way excessive growth is checked. The planting of tops in their permanent rows can only result in early failure, and should be discouraged by every practical grower. There is still one other class of plants, known as butts, and plants from which fruit has been cut, and I regard these as the worst type of plant one can put in. My reason for so doing is that this class of plant has spent its energy in the production of its fruit, and is not a fit subject to become the parent plant of future generations. Of this much I am certain: It will not produce a vigorous foot growth, and in every case the first sucker it produces will be so loosely attached that a good breeze will blow it over.

These plants also develop what I term the "corkscrew root," and result in faulty patches all through your rows. This system of rooting is simply the result of this butt being three or four removes from the parent plant, and it is impossible to get its roots into the soil, and as a result the roots wind themselves round and

round the butt of the plant and simply choke it. I have pulled out scores of these plants after a period of two years, where condition and soil have been as nearly perfect as possible, and found that where this corkscrew root is planted so it continues, with disastrous results. I know of no disease in pines in our State beyond defects that can only be described as a condition set up in many cases by sheer neglect. I am of the opinion that a fortune awaits the grower who is prepared to carry out a thorough system of selecting and propagating pine plants of highest order. Again, let me say that the absurdity of propagating from a parent plant that is producing small and deformed fruit, also shy bearing and other defects, is too patent to everyone and against all laws of Nature. I believe it pays to clean a few leaves off the bottom of plants when planting, as I am a great believer in starting the plant off with every advantage that it is possible to give, and, small though this may appear, the great factor is root growth, and it certainly encourages this. I am very much opposed to the hard trimming of plants, except in cases where plants have to be carted long distances. Plants that are hard-trimmed and planted late in the season, just previous to winter, get such a check that it takes a year to recover, and I have known some of these plants to even die. I have never yet known an untrimmed plant to die, and I would ask you to draw your own conclusions.

It is a well-known fact that pines draw a portion of their living from the air, otherwise how could a plant live and make an attempt at growth when it is hung upon a wire fence?

Wherever possible, I would always plant my rows running north and south, as in this position every plant gets the full rays of the sun at some period of the day. Rows running east and west will always show more failures on the southern side of row. Rows as near as possible 3 chains in length facilitate easy handling of fruit.

I am opposed to surface manuring of pines for at least the first two years, and where it is felt that the ground is not capable of producing its first fruit without some assistance, then manure, preferably bone dust, should be placed under the row before planting.

We now pass on to methods of planting, and just here I should like to state that I have never yet seen any good result from deep planting, but rather a great amount of harm. Deep planting must always result in retarded growth till such time as the plant gets into its natural position, and the deep planting of pines in poorly prepared land is starting at the wrong end. I would plant in a moderate furrow, drawn by a one-horse plough, and cover the plant to not more than 3 inches below the surface. I consider it advisable to plant all the rough leaf family in single rows from 9 to 12 inches apart and 8 feet between rows. Smooth leaf in double rows, about 12 to 15 inches apart each way, and also 8 feet between rows.

The chief point to be observed is, that all the rough leaf tribe sucker too freely, and the dense rows of plants do not always produce the most fruit. On the other hand, the smooth pine grows too rank, and, as large pines are undesirable, to obviate this it is wise to crowd the plants and check the growth. It may be argued that 8 feet between the rows is too close to allow of proper cultivation when the rows close in. In more recent years it has been found that better results can be obtained by replanting at an earlier stage. Generally speaking, the yield of pines increases annually up to the end of the first five years after planting, and after that period of time the quality of pines is on the down grade, and the percentage of barren and shy-bearing plants is a growing quantity.

PRODUCTION.

I am fully persuaded that nothing is to be gained by hanging on to a row of pines when their vigour is waning, and would advise to cover up the land with close planting, and the early replanting of same. This will give a more uniform grade of pines and a better yield, which are two very desirable features.

MANURES.

We now come to the question of manures, and to this I can apply myself very forcibly, as I have always been a great believer in systematic manuring, and any success that has attended my efforts as a pinegrower has been solely from this cause. The grower who fails to keep the wants of his plants supplied is not alive to his own interest, and will soon pass out. He will tell you that there are other crops that pay better, and you will find every crop under the sun growing between his pines—to say nothing about the weeds.

We will now pause for one moment to consider the strain that is placed upon the land with our climatic conditions in the growth of pines. Here we have a mass of growth averaging, when in good vigour, from 60 to 80 tons per acre, making a

demand from the soil and producing, without a single break, every day in the year. Is it to be expected that the pine can go on indefinitely performing these functions without some assistance?

Since the supply of potash has ceased, growers have been faced with great difficulty in supplying the wants of the plant, and there has been a general rush for lime during the last twelve months. I would here sound a note of warning to the grower who puts lime into his land solely as a manure. I agree that there are benefits to be derived from the use of lime, and in its place it serves a useful purpose in the sweetening of our soils and the neutralising of some of the acids where the drainage is not of the best, such acids being very injurious to the growth of pines. At the same time, let it be remembered that lime does not enrich the land, and it is only where there is a deficiency of lime in your land that the plant will make use of it as a plant food, and, personally, I am not prepared to accept the statement that lime is a fertiliser and a direct plant food, and practical use of lime must be carried out with a free use of fertiliser at the same time, and the free use of lime, without first ascertaining whether your soil requires it, is surely a gamble. I have previously pointed out that, especially with the smooth pines, a moderate growth is desirable up to the period of production of the first fruit, and we will now take up the running.

Now is the most critical time, as far as that plant is concerned, and a golden opportunity for the grower who knows his business. The plough should be run along at a depth of about 8 inches, and 9 inches from the plant, and a furrow thrown away from the row. Into this furrow I would put, per acre, not less than 15 cwt., and, if possible, one ton of meatworks fertiliser showing the greatest percentage of dried blood. My sole object in manuring has always been the future utility of the row and the production of intermediate pines. The poorly fed rows of pines, with their lack of vigour, wait for the most favourable opportunity to produce their fruit, and these two periods each year are glut ones when low prices prevail, and intermediate fruit, and consequent high prices, are conspicuous by their absence. On the other hand, where the row is well fertilised, and surplus energy is produced, plants are forced out of their usual order, and you will find suckers not only making their appearance when the plant is fruiting, but also popping out here and there, and in many cases springing from below the surface of the ground. These plants bear their fruit very largely in the order in which they make their appearance, and are the sole factor to the future success of your garden.

In the application of manures, it should always be remembered that very little, if any, value is obtained by the plants for the first three months after applying same. There are two periods in the year when we can plough freely in pines, without the danger of knocking off a lot of the fruit which hangs on outside of rows. These months are March and April, and September and October. The former months, in my opinion, are the most desirable, as they help to warm up the land during the winter, and when the spring arrives, the manure is available, and no time is lost by the plant in making use of it at a period of the year when two-thirds of your growth is produced. On the other hand, when manure is put in at the spring of the year, very little good can result, as the best season for growth in the year has been disturbed, and the manure is no sooner available than winter is here, and one has to wait until the following season for results. The practice of applying a little manure, and often, does not meet with my approval, and I very much prefer the one good dressing annually at abovementioned periods. My reason for so doing is that to get value with every application of manure there must be thorough cultivation and working of manure into the soil, and after this is done the plant will require a period of rest to enable it to lay hold of the new supply of plant food. No language is strong enough for me to express my disapproval of the system of middle crops in pines, so prevalent, and to me it is an abomination. Where pines are only a side line, and rows are to be used as a preface to run tomatoes, and other crops, it is all very well, but where the object in view is the establishment of a permanent pine garden, this practice is absolutely suicidal. With the exception of bananas, there is no other crop which makes so great a demand upon the land as pines, and I know of no crop which is so uniform in its yield in and out of season. Drought has little or no effect upon the plant, and grown under proper conditions, it gives the best returns of any crop that can be grown in Australia. These are not mere theories, but undisputable facts. It is a well-known fact that virgin land with a rich supply of humus is of more value to the pine plant than all the artificial means that the growers can bring to their aid, and the point that I wish to emphasise is the necessity of conserving this humus, and not allowing it to be used up by middle crops yielding doubtful profits, but rather to retain it in the soil for the use of the pine as it increases its demand upon the soil. The tomatoes are the greatest offenders in this respect, and not only rob the pine of its food, but, where the foliage is allowed to cover the pines, they simply poison the plant, and the failure of that row of pines is certain. Then again,

the preparation of the land for these middle crops usually takes place in the middle of winter and soil is gathered away from the row to form a nice bed in the centre. Roots of pines are laid bare with open furrows at a period of the year when every plant passes through a crisis, and permanent injury to the constitution of the plant must follow. My advice to every grower is, first of all, to determine what his ground is adapted for, and grow that crop pure and simple. We hear a lot of so-called experts who tell us not to put our eggs in one basket, and the more crops we have, the more chances of success. Don't be led astray with this nonsense is my advice. Cast your eyes around in every walk of life, and you find the man who is making the greatest success of his business is the man who specialises and concentrates the whole of his energies on the one object. I have a good general knowledge of the success that has attended the efforts of the leading fruitgrowers of Queensland to-day, and I say, without fear of contradiction, that single purpose and one crop have been the principal factors of success. I am very much opposed to the ridging of pines, and advise all growers to cultivate on the flat principle. I ask you, in accepting this statement, to keep in mind my practice, as elaborated earlier in this paper, of establishing a low-set row under proper conditions. The principle of packing 6 inches of soil against a row to keep the plants from falling is absolutely wrong. It is both important and necessary that plants should fall, and make their own root growth direct to the soil. Imagine a row of pines six years of age growing straight in the air with several feet of dry shanks, and only one aged system of roots through which the production of all fruit must come, and you must feel at once with me in this statement. Undoubtedly the process of falling is necessary, and the evil lies in the first sucker having too far to fall—in other words, your first growth will determine the life of that plant, and no amount of ridging, or, in fact, any other method, will overcome this defect. When the sucker has fallen, it has its roots out in readiness, and these at once fasten on to the soil, and that plant takes a new lease of life and its real productiveness begins. This is a critical stage in the history of every row of pines, and after this process is properly overcome, the growers' returns immediately double themselves. If the ridging of pines is begun the second year after planting and continued yearly, the position soon becomes unbearable, and can only have the effect of further forcing the plants out of the ground. It will also be found that where this practice is in force, the roots of pines will grow out on to the surface of this ridge on outside, and where roots come on to the surface in this manner, pines will never do well. I believe in one good ploughing between pines annually, and plenty of scuffling with the Planet Junr. with wide sweeps in between times. When the annual ploughing takes place, I do my manuring, and for this purpose I trim leaves hard back to as near the stalk of the plant as possible, taking care in this operation not to cut the top leaves, but cut at an angle close in at bottom and wide at top. My reason for this is to keep the surface of the ground clear of the heavy mass of leaves which the growth of the plants has to pass over as the row extends. Where trimming has been neglected, it is most noticeable in the pulling out of old patches of pines that the roots have travelled all over this layer of leaves and failed to get through, and very much resemble a fibre door mat. This point is a very important one.

Some growers are to be found even to-day who tell you that pines do not require ploughing, and that it is injurious to them, and to that statement I would reply, that the man that does not plough and work his pines will be the first to plough them out. Methods of cultivation are very simple. After the trimming of plants, open furrow away from the row about 6 inches deep, fill in manure, and plough back and finish in centre of row. Your row will now be ridged. Leave in this condition for about a month, and then run the scuffler one turn up each side and pull soil down. By the end of the year your soil will be quite flat, and you repeat the operation. Don't wait till you see the weeds in bloom before you start your cleaning. It may rain, and a hundred other things happen to prevent you carrying out the work, and before you know where you are you have enough seed to keep you in constant work for years. The plough is the only implement that will take weeds up, and the use of all scufflers should be to prevent weeds from growing.

Let me say, in conclusion, that I shall feel rewarded for any trouble I have taken in the preparation of this paper if, as a result, I could instil into growers generally the fixed idea of thoroughness, and always the absolute necessity of providing for the future. My whole being, heart and soul, has been for many years, and still is, wrapped up in the pineapple industry. I have been surrounded for years with nothing but pines to my very doorstep, and lived for nothing else other than the careful observations of the habits of the plant, and the carrying out of the careful experiments with all classes of plants, manures, and methods of cultivation.

A FEW HINTS ON STRAWBERRY GROWING.

By WILLIAM FRENCH.

Mr. French, who is a successful veteran strawberry grower at Wellington Point, wrote a very informative article on the cultivation of the strawberry, which was published in this journal in January, 1911. During the succeeding years to date he has been continually experimenting with a view to improving the standard of this favourite fruit. His ripe experience, as detailed in this issue of the journal, should prove of great value to those already engaged in this industry, as well as to beginners.

Mr. French writes:—

The strawberry belongs to a genus of low perennial stemless herbs, with runners and leaves divided into three leaflets; calyx open and flat, petals five, white; stamens ten to twenty, sometimes more; pistils numerous, crowded upon a cone-like head in the centre of the flower; seeds naked on the surface of an enlarged pulpy receptacle called the fruit.

It belongs to the great rose family, and the name of the genus is *Fragaria*—from the Latin, *fraga*, its ancient name.

Fragaria vesca is the wild strawberry of Europe; *Fragaria californica* is found growing on the mountains of California; and another variety, *Fragaria chiliensis*, is also found growing wild in Upper India, and is also found wild in Germany.

Therefore, by cross-breeding and fertilisation, those wild weeds, as you might call them, have been raised in thousands of varieties, and to-day the cultivated strawberries rank as one of the leading first-class fruits of the day, and I believe they can still be greatly improved in size, flavour, and productiveness, by which, instead of giving us a harvest of six months' picking, they can be brought to fruit for eight or nine months. Taking into consideration the small plants and the amount of fruit they produce, I consider them a marvel, but "much always wants more." How the name of strawberry came to be applied to this fruit is unknown. Some say it was because children used to string them upon straws to sell; others believe it arose from the practice of placing straw around the plants to keep the fruit clean. But there is nothing conclusive on this point. The strawberry does not appear to have been cultivated by the ancients or even by the Romans, and it is only within this last hundred years that there has been any improvement in the varieties under cultivation.

FIELD CULTURE.

Soil and Preparation.

In my opinion, the main point to be observed is to secure a depth of soil with good drainage and plenty of nutriment for the plants. If planting in new soil, give nothing less than two ploughings, say, 4 inches deep. After the first ploughing allow the land to lie exposed to all weathers for a month or two, after which give a good harrowing across the furrows, and after a few days run the roller over to break all lumps, the reverse way of harrowing. Then give a second ploughing, nothing less than 8 or 9 inches, or deeper, if possible. Better still, run the subsoiler after the plough, as I find it to be of great advantage in allowing the roots to penetrate deeper, and also in retaining moisture against dry spells.

Explosives.

In reference to subsoiling by explosives, I have had good results simply by making a hole 18 inches deep with a crowbar about every 9 to 12 feet apart, attaching a detonator and fuse to a plug of explosives in each hole, and then light, which I consider is a very good way to obtain splendid results, especially when the subsoil is of a stiff nature.

Let it lie for a week or two exposed to the atmosphere. Then, after a shower, roll again, and, if required, harrow again, to make sure that the soil is properly pulverised, as this is, I consider, the foundation of success, and therefore a most important point is to have the soil under proper tilth, or, as the saying is, to have the soil like an ash-heap, so that the roots of the plants can lay hold of the soil at once after they are planted. If the soil is left rough and lumpy, the roots cannot get to work. Therefore, after a few days of wind and sun the plants are parched up, and hence the aggravating work of filling up misses, which I consider is very disheartening and a serious loss of time. New soil is greatly improved by growing a crop of fodder, say, oats, barley, or cowpea, which, if not required for feed, can be ploughed in as a green manure, by which means you will find your soil will work as mellow again.

Small Garden Culture.

Trench the beds about 5 feet wide and 18 inches deep. If the subsoil is of a clayey nature, leave it at the bottom of the trench, but if fairly good mix it with the top spit along with plenty of vegetable matter, rubbish, &c. Let it lie for a month or more to mellow. Then fork and pulverise well until the soil is free from lumps. Now let it rest for a week or two. If farmyard manure is procurable, scatter it on the surface 2 or 3 inches thick, and fork it in well, so as to mix the soil and manure thoroughly. In a fortnight it will be ready for planting. Plant four rows in a bed. By having narrow beds, trampling upon the planted soil is avoided. Set the plants about 1 foot apart in the rows. Planting close in the garden necessitates replanting every year, whereas in field culture more room is given. Several varieties can stand for two years giving good results, by keeping the soil between the rows constantly cultivated, which I maintain must be done if good results are to be obtained.

Preparing for Planting in Field.

My plan is to draw out drills with the plough as deep as possible about 2 feet 6 inches apart, and put the manure in the trench. If artificial manure is used, draw a long-toothed rake along the furrow to mix the manure and soil well together. This is not necessary with farmyard manure; merely run the Planet Junr. between the drills to cover in the manure, and leave it as level as possible. If this latter point is not attended to, you will find that after heavy rain the plants in the hollows will be buried with their crowns too deep, and consequently they will be weeks before they make a start into growth.

Manures.

The strawberry is a plant that will not refuse a fair amount of manure, providing it is presented in a proper form. My experience is that the plants make a start into growth much quicker, and are well established before the winter, where I use the farmyard manure, but I am sorry to say it is too scarce. The principal manure I use to plant on is bonedust, at the rate of about 10 cwt. to the acre. I find that by putting the manure well down below the surface it greatly encourages the roots to strike downwards, and the lower they get down the more moisture they obtain, and are thus not affected by the heat and drought half so much as when the roots are encouraged close to the surface. After the first crop is gathered I mix my own fertilisers, consisting of superphosphate, sulphate of potash, and sulphate of ammonia, in the following proportions:—Two parts superphosphate, 2 parts sulphate of potash, and 1 part of sulphate of ammonia. Make sure to break all lumps so as to have it well mixed, as this is an important part. I have a small hand plough, which I run along the rows, and it makes a furrow about 2 inches deep. Sow the mixture in the furrow, and by running the plough the reverse way it covers over the manure.

Pulverised Lime.

I find of great benefit in fruit culture, especially in strawberry culture. With the continuous cultivation of the soil, it becomes what is called sulky—that is, it consists of a lot of hard lumps, instead of soil of a free and friable nature, and I find that condition to be most detrimental to such fine fibrous roots. I would advise about 6 to 10 cwt. per acre of pulverised lime to be scattered over the ground before the last ploughing is done.

Planting the Strawberry.

While it is impossible to fix a hard-and-fast time to transplant, as the seasons differ so much, I shall have to leave it to the grower's own judgment. If your ground is in good order and the weather showery, you can start on the 1st of March. I also prefer young runners. Some growers say they get the best results from old crowns split up, but that is not the case with me. I plant about 2 feet 6 inches between the rows and from 1 foot to 18 inches in the rows, to allow the horse and scuffler to go between the rows, so as to keep the soil always open, which I consider of great importance. In transplanting, some recommend shortening the roots by one-half. I consider this practice all right in the cooler countries, where the ground is, practically speaking, always moist and cold below; it is also a good practice in cases where the roots are allowed to get dry or are injured in any way. In such cases a clean cut would, in my opinion, be beneficial. My way of planting is to allow the roots to hang down straight in the hole, the deeper the better on account of coolness and moisture, provided the crown is not smothered. Some cultivators use a dibble for planting, making a round hole, into which the roots are thrust in clumps. Others just scratch a handful of soil off the surface and plaster it back on the roots, the latter lying in a horizontal position, instead of hanging perpendicularly in the hole. Plants might live under such treatment, providing we had showers every day, but careful planting with a trowel is far the better way.

VARIETIES THAT ARE DOING BEST WITH ME.

Phenomenal has stood for years, and is still good for box and jam work, being good in colour, size, and flavour.

I have a seedling which some in the trade call "Frenchii" and which I consider to be equal to any good box berry, with splendid colour and flavour, robust habit; also a long cropper and free from disease. As for jam-making, to use the words of a manager in a leading jam factory, "There is nothing to equal it."

Usher's Special.—There are many still growing this variety, which is late in starting to fruit, but it is a heavy cropper while in season. It, however, does not stand the wet.

Ettersburgh or so-called *Tree Strawberry.*—With me the name only bears any resemblance to its peculiar growth, this being the third year I have grown it. How the Southern people could give it such a name, I fail to see. I have always understood that nothing under 30 feet should be called "Tree." I cannot meet any grower who can say he has been satisfied with this variety. I have crossed it with my seedlings, and so far it is promising well.

Illawarra variety is, I believe, going to turn out good so far as it has gone, this being the first year I have grown it, but a friend of mine grew it last year with splendid results, the berries being large with a fine dark colour, good flavour, and the plant a good strong grower.

The following varieties, I am sorry to say, have fallen back since I read my last paper:—*Glenfield Beauty, Trollop's Victoria, Annetta, Marguerite, Federator, Pink's Prolific, Noble, Royal Sovereign;* and *Aurie,* which I consider was one of the best all-round strawberries in cultivation, I am sorry to say, is one on the wane. I should like to see Mr. C. Court, the originator of the Aurie, bring along another such excellent production.

PROFITS OF STRAWBERRY CULTIVATION.

Persons who have had no experience in raising strawberries for market are desirous of ascertaining in advance the prospects of profits on investments. Unfortunately for the would-be investor, results depend greatly upon circumstances, such as markets within reasonable distance, plenty of labour at moderate prices when needed, land at reasonable prices, also fertilisers, and favourable seasons. The greatest profit made in the cultivation of the strawberry is by small growers within a moderate distance of the towns, who have children to assist in gathering the fruit when needed. An acre of strawberries under high cultivation, with the fruit gathered and marketed in the very best condition, will often yield more clear profit to the grower than 10 acres under opposite conditions.

MULCHING.

Forest oak leaf makes a splendid mulch when procurable. If not, half-decomposed leaves would keep the fruit clean from grit, and also do a great deal of good in furnishing the plant with humus, which is a favourite of the strawberry.

Referring to planting old crowns, I have been making a further test this year with the Marguerite and Trollope's Victoria. A very good variety for colour. Then they took about a month longer to establish themselves than the young runners. Therefore, if the weather is dry, they are very unsatisfactory. Yet they came into fruiting first with a very light crop.

A FEW REMARKS ON SMALL FRUITS.

I consider there ought to be something done regarding the fixing of prices. For instance, for, say, jam berries, prices should be a little more regular than at the present time, so that growers and manufacturers could work with more confidence together, instead of carrying on this cut-throat competition, the outcome of which is certain to grind the hard-working tiller of the soil down, until eventually he is forced to give up growing the small fruits and take to growing large fruits, where less labour is required for cultivation and marketing. I consider this evil could be overcome to a great extent by a conference between manufacturers and growers, considering the demand for this fruit is about 400 per cent. higher than the supply, taking a manufacturer's own statement for it, and also the scarcity of same on our local markets.

STRAWBERRY INSECTS AND DISEASES.

Crown Borer (*Tyloderma fragariæ*, Riley), White Grub.—One-fifth of an inch long, boring into the crown of the plant in midsummer. The mature insect is a curculio or weevil. In reference to this pest, to the best of my belief, Australia is free from it.

Remedy.—Burn over the field after the fruit is picked. If this does not destroy the insects, dig up the plants and burn them.

Strawberry Leaf-blight, Rust, or Sun-burn (*Sphœerella fragariæ*, Sacc., including Ramularia).—Small purple or red spots appearing on the leaves. These eventually become larger, making the leaf appear blotched. Most serious after the first crop of fruit is picked.

Remedies.—Spray with Bordeaux mixture at intervals of two weeks, as soon as the fruit is picked. The leaves are easily destroyed, without injury to the plants, by quickly burning off a thin layer of straw, which is spread over the patch after the fruit is off.

I am pleased to say that we have several varieties, practically speaking, free of this disease. This includes also our locally-raised ones, which I have already made mention of.

The strawberry, as indeed all plants, takes certain substances from the soil—viz., "manurial ingredients." These may be defined as those substances from which the plant derives its supplies of nitrogen, phosphoric acid, and potash. Now, it must be remembered that all plants require adequate supplies of these three manurial ingredients, but different plants require them in different proportions.

For example, sugar-cane requires a great deal of potash, relatively little phosphoric acid, and much nitrogen.

An acre of strawberries will contain—375 lb. potash, 222 lb. nitrogen, 83 lb. phosphoric acid.

In 7 tons of farmyard manure there will be an average of—74 lb. potash, 77 lb. nitrogen, 57 lb. phosphoric acid.

Compare these figures, and it would be seen that farmyard manure would be a badly balanced fertiliser for strawberries, because in order to supply sufficient potash considerable excess of nitrogen would have to be supplied, and a very large excess of phosphoric acid; so that it would appear as if a much more economical manurial dressing could be prepared if, instead of farmyard manure alone, a combination of farmyard manure and artificial be used. But where farmyard manure can be produced on the farm, then, for a first crop, it is preferable to all other manure.

For strawberries, when farmyard manure cannot be obtained, a good dressing consists of—3 cwt. bone dust, 3 cwt. superphosphate, 1 cwt. dried blood, ½ cwt. sulphate of ammonia, 2 cwt. sulphate of potash per acre, or in these proportions.

DISTRICT FOR STRAWBERRY-GROWING.

The writer maintains that the district between Manly and Redland Bay is the most favourable in the State for strawberry-growing, considering it is practically free from hailstorms, and is seldom visited by those hot winds which injure the strawberries after the thermometer passes, say, 85 degrees Fahr. Quoting Bulletin 62 of the Central Experimental Farm, Ottawa, Canada:—"The first ripe fruit had been obtained on 16th June, and the last picking of the latest varieties was on 19th July. The province of Quebec is much later, the first fruit not being ripe until the first week of July, and the season continues to the second week of August."

SEASON.

Thus the strawberry seasons for the two provinces cover about two months. Just for the sake of comparison, I refer to the year after I read my last paper on this subject, 1909, when I took a prize for a box of strawberries at the Chrysanthemum Show, in Brisbane, on 23rd April, 1909. In the following February, about the middle of the month, I finished my season's crop by sending up a keg of strawberries to the factory. Thus only one clear month out of the twelve elapsed that I did not market strawberries. This, I consider, constitutes a record for a strawberry season in Queensland. I can only account for this by the raising of seedlings locally, because the plants are well acclimatised, and will stand the severe changes of the seasons. The North Coast Line seems to be falling off in strawberry-growing, and the growers are taking to larger fruits, in the cultivation of which there is less labour required. There

is certainly no crop demanding such constant attention as the strawberry; but, on the other hand, the grower has not to wait long before he receives the fruits of his labours. By planting in February or March, the early varieties will fruit in three months, providing the season has been favourable for planting and the ground in first-class condition. As to the yield from an acre of strawberries, there is a wide margin to come and go on, as some growers are more successful than others. One factor in the difference of yield is the different varieties grown. One variety will do well this year, yet in the following year the grower will find with the same variety he is 50 per cent. short on his returns. Another point to be considered is the method of marketing the fruit. Strawberries will not stand rough handling, especially during the heat of the summer. As to yield, I will endeavour to strike the happy medium, and set it down at from £80 to £100 per acre. Some, no doubt, will say this is too high; others consider it too low. Between the two I might, perhaps, find my average. Referring to the amount which each individual plant bears, the old average has been ½ lb. fruit to each plant, which I consider a very low average, because, if the ripe fruit on some plants is weighed, the half pound is arrived at without taking the whole of the season into consideration. Turning again to the Bulletin above mentioned, Mr. W. Wheeler, Concord, Mass., states that of some varieties he picked more than 2 quarts per plant. Now, roughly speaking, a pint is equal to 1 lb. in weight. That means that he picked, in round figures, 4 lb. per plant. Our ½-lb. average per plant was struck years ago, when the old sorts were grown, which are now discarded altogether as practically valueless. That will, I think, account for the difference. We may, therefore, reasonably put the average up to 1 lb. per plant. A table in the Bulletin gives the best average weight of 25 berries of 50 varieties at from 4¾ oz. to 8 oz. Our varieties, such as "Usher's Special," are so large that a pint box will only hold from 12 to 15 berries well packed. Allowing 12,000 plants to the acre, that would bring our yield up to 12,000 lb. per acre at the average of 1 lb. per plant, or 5¼ tons.

Picking Strawberries.

This is rather a difficult subject to deal with, as a slight difference in the ordinary rates makes a wonderful alteration in the year's account. About two years ago strawberries could be picked for ½d. per lb., but of late 1d. is demanded by the pickers; so I engaged them by the week, and this seems to be satisfactory. Of course, the business pays best where there is a young family growing up. It not only pays better, but it is also healthier for the children than sending them to towns to work. Speaking from my own experience and from what I learn locally, there seems to be no serious difficulty in picking when pickers are engaged for the season. The cost of picking has, as I said, increased by 100 per cent., and the only way I can see by which to balance the account is to go on advancing in higher cultivation, resulting in larger crops and larger fruit, and that means less labour.

Trays, Punnets,* or Boxes.

When the strawberry growers first took up this branch of agriculture around the metropolis, the majority used the trays for packing the fruit for market. One reason for this was that they could procure the timber on their own land, and split for themselves—a work which gave employment in making trays for wet days; but, as time rolls on, timber is getting scarcer and the demand greater, for where there was 1 acre of strawberries in those days there or 50 acres to-day. Of course, paper-box manufacturers were quick to note the demand for trays, and stepped into the breach with good results since. As time went on the more land went into cultivation, and the less time there was for making trays. I think that the pint boxes are a great deal more convenient for the shops and also for the individual customer than trays, seeing that the convenience of the public must be studied. If a person wishes to purchase, say, 1 pint or 1 quart of strawberries, the shop has to repack, which is most injurious to the strawberry. The less handling the fruit gets, the better for all concerned. In reference to punnets, I don't think they will ever come into favour in this State. Our great objection to it is the berries lying one upon the other. Some of the varieties will stand it to a certain extent, while others will not carry so packed. If one berry breaks the fruit starts to deteriorate, and, by the time the customer gets them, they are anything but enticing as regards flavour, size, or appearance. Of course, in England the climate is very different to that of Queensland. It is not often that they have a temperature of 80 or 90 degrees in the shade in which to pack strawberries.

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* A punnet is a shallow basket used in the London markets, holding about a quart. A pottle of strawberries is a large tapering basket holding rather more than 1½ pints, although it is supposed to contain half gallon.

Viticulture.

THE OHANEZ GRAPE.

THE MAKING OF A BIG INDUSTRY.

When one considers the importance of the fresh grape export trade from Spain to the London and continental markets, and makes allowance for the fact that this huge trade is conducted under what we might term adverse conditions as regards the season of the year when these grapes are offered for sale, it becomes at once clearly evident that could this class of fruit be offered to the British, European, and North American public in the summer months instead of the depth of winter, that the resultant trade would be of far greater dimensions than that already attained by Spain.

The exportable variety of grape is called "Ohanez," though it is more popularly known as Almeria to the British buyer, on account of the heavy shipments of the "Ohanez" variety that come from Almeria in Spain. It is important, however, to distinguish this variety by its correct name.

The export of grapes from Spain begins about July of each year, and continues until December, and during this period some 2,353,000 barrels are shipped. A Spanish barrel contains 53 lb. net of grapes. This will give some idea as to the extent to which this trade has developed.

Australia is so situated geographically that it can supply the markets of the Old World with fruits when the home market is bare, and noting the importance of the grape industry and the scope for development in Australia, the publishers of the "Fruit World," in order to test the carrying qualities of the "Ohanez" variety of grape, arranged with Sir John (then Mr.) Tavernor, the Victorian Agent-General in London, at the end of 1908 to send a keg of "Ohanez" grapes to Melbourne.

An ordnary keg of Ohanez grapes was purchased from the thousands of barrels arriving at that season. This barrel had been shipped from Almeria in October, 1908, and was reshipped for Victoria as *general cargo*, and arrived in Melbourne on the 8th December, 1908. When opened up the grapes were found to be in a perfectly sound condition. (See illustration.) A report published at that time (*vide* "Fruit World," 23rd December, 1908, pp. 344-347) states *inter alia:*—

"The keg of Ohanez grapes from Almeria, Spain, *viâ* London—over 12,000 miles—was opened up at the Department of Agriculture on the 8th December, 1908, in the presence of Mr. Duffus, Secretary for Agriculture; Mr. F. de Castella, Government Viticulturist; Mr. J. G. Turner, Chief Inspector of Fruit; Mr. T. Thomas (Thompson, Thomas, and Co.), and others, also representatives of the daily and weekly Press. . . . Everyone present was delighted with the experiment, which is in reality an object lesson to Australian growers and is sure to pave the way for further developments. . . . The fruit, as illustrated, is very handsome, the flesh is firm and sweet, and when sampled the taste was as fresh and pleasing as if picked the same day; in fact, the bloom was still on the fruit, though picked over twelve weeks.

"Besides its high quality and carrying powers, it also has the distinct advantage of being mould resistant.

"According to Mr. de Castella, the Ohanez variety ought to thrive in Northern Victoria, where the air is drier than that of Almeria, and the resistant character of the Ohanez grape would be well developed.

"*The advantage to Australian growers would be the obvious one of being able to place the fruit on the markets of the other side of the world when Spanish grapes would not be available.*"

A well-known Melbourne wholesale fruit merchant, who has also had experience in Covent Garden Market, England, stated at the time:—

"It will be noted that the Spanish grapes arrive in England *in the winter.* Grapes sent from Australia would arrive *in the early summer.* I have advocated for years the planting of the Ohanez grape vine for the purpose of marketing the fruit across the sea."

OHANEZ GRAPES IN VICTORIA.

The foregoing experiment paved the way for the establishment of the export grape industry in a small way, and considerable success has followed the efforts so far made. The illustration showing a case of grapes is indicative of the quality of the Ohanez under Victorian conditions: the white disc on the illustration is a half-crown, and by comparison the size of the berries can be seen to advantage.

That Australian-grown Ohanez grapes are viewed with favour in the markets of the old country has been demonstrated. What was termed as a "mild sensation" at the time was caused by an Australian grapegrower exporting 228 cases of grapes by the R.M.S. "Otranto" in 1910 which were sold on 14th May in London. The Ohanez grapes brought 21s. to 22s. per case. Two other varieties exported at the same time—namely, Flame Tokay and Purple Cornichon—also brought good prices. A consignment of 104 cases of Ohanez grapes by R.M.S. "Mongolia" in the same season sold at 15s. to 33s. per case. The case here referred to contains approximately 25 to 30 lb. of fruit.

The following comparison with regard to Ohanez grapes will be noted with interest:—

Country of Origin.	Time of Arrival in London.	Prices per lb. Wholesale.
Spain	Winter	2d. to 4d.
Australia	Summer	9d. to 1s. 0½d.

Victorian growers have received gross returns of from £150 to £200 per acre from this variety.

PACKING THE GRAPES.

The *granulated cork* in which the fruit is packed is very cheap in Spain, being milled from the waste. There would be no difficulty in Australia in obtaining this commodity. Grapes so far sent from Australia have been packed in cork dust, which is regularly advertised for sale.

A prominent expert has pointed out that the climate of Victoria and that of portions of the Spanish Peninsula where cork trees are grown are very similar, and that there are opportunities in Victoria for the still larger development of the cork industry. In Portugal, where there are 525,000 acres of cork trees, producing 50,000 tons of cork, valued £820,000, there are Australian gum trees growing side by side. The cork tree is also valuable from the standpoint of beauty and their usefulness as shade trees. They are commercially valuable for producing cork from ten years of age.

EXTENSION OF THE INDUSTRY.

To develop the grape industry, it is necessary that larger areas be planted in order that there shall be a sufficiently large exportable quantity to command the attention of buyers on the other side of the world, and that these supplies be maintained regularly each season.

A prime necessity for the development of this industry is suitable land, convenient to railway and having an assured water supply.

In this connection a valuable opportunity has been made available by the Australian Farms, Ltd., King street, Melbourne, a company which has already done much to place settlers contentedly on the land, and which is to be congratulated on its latest progressive move with regard to the development of this highly profitable and important realm of viticulture. The Australian Farms, Ltd., have secured an area suitable for the cultivation of the Ohanez grape, the site being on the borders of Kangaroo Lake in Victoria.

Irrigation is available throughout the property, while there is a railway station in close proximity to this land, which is to be subdivided.

With a view to putting this splendid proposition before intending settlers, this company's representative, Mr. R. V. Billis, has left for London, and his London address will be care Mr. W. Delap Goslap, 128 Hamilton House, Bishopsgate, London, E.C.

Australian Farms, Ltd., propose to offer prospective settlers facilities on the following lines:—The company will plant out under expert supervision any area desired by the settler, and until such time as the settler can make the necessary arrangements to reside thereon. The company will provide skilled labour for the cultivation and care and attention required to bring the planted area to a bearing stage, which will be about three years. Having reached a productive stage, it is the intention of this company to provide suitable facilities for the marketing of the crop. Under this method of settlement, with terms and conditions sufficiently easy, the way is open for persons with limited capital to safely and comfortably establish themselves in a profitable going concern.

Apiculture.

MODERN BEE-KEEPING.

We are assured that the Dutch bees now being brought over to this country by the Board of Agriculture will do a great deal to prevent the Isle of Wight disease, but is is very hard to find the slightest scientific support for this rather blatant optimism (writes "An Old Bee-keeper" in the London "Chronicle").

As a practised bee-keeper, I begin to wonder whether the thin machine-made bar-frame hive does not lie at the root of the trouble. We have to remember that bar-frames are made to suit the convenience of the owner of the bees; the bees themselves are not consultd.

Now, in the old days, bee-keepers who kept their stock in straw skeps talked a lot about what they called the May pest, and as far as I have been able to gather, it was a mild form of Isle of Wight disease—in all probability *Nosema apis* was there, but was not as virulent as it has proved in the past few years.

Influenza in the early Victorian times was an affair to laugh at—witness the very earliest volumes of "Punch." To-day it kills its thousands, and leaves a clear road for other diseases. I think that we laymen who lack all scientific knowledge are justified in believing that the intensity of epidemic diseases may vary greatly with the years.

THRIVING COLONIES.

I have noticed in the past few years that bees in church towers and house walls have not suffered. Where the colony lived it still thrives and the swarms that issue are healthy and hardy. Why is this? In all probability, the place they have chosen is warm and dry in winter. The old skeps, for all their disadvantages, could be kept in like state, and in the hands of experienced owners, the bees chosen for survival wintered well.

To-day the most of the bar-frame hives in use are made by machinery, turned out by the hundred. The wood is not always well seasoned; it is sure to be thin, and when winter comes, does not avail to keep the brood box warm. This, at least, is my experience, and it has led me of late to double the normal thickness of the hive floors.

An expert of my acquaintance goes further than this. He claims, and with every justification, that hives should not be kept standing a few inches above the bare earth on cold, heavy soils. He thinks a little concrete or a well-ventilated wooden floor, would probably help to keep the hive warm, and the roof is as important as the floor. The damp may get through and reach the covers under which the bees are wintering. If this should happen, the weak bees will die, and those that remain will not be in the necessary numbers to maintain the proper temperature of the hive.

SOCIETIES, SHOW DATES, ETC.

The Show of the Herbert River Pastoral and Agricultural Association has been postponed from the 8th and 9th August to the 12th and 13th September, 1919. J. W. Cartwright, secretary.

At a meeting of members of the Central Warrego Pastoral and Agricultural Association, Charleville, it was decided to abandon the Show for this year.

NOTE.—Barmoyea, *viâ* Rockhampton. The Caves Farmers' Progress Association to be altered to—THE CAVES:—Cave Farmer's Progress Association, North Rockhampton.

WARWICK.—The next Annual Show of the Eastern Downs Horticultural and Agricultural Association, postponed from 13th and 14th May, 1919, will be held on 10th, 11th, and 12th February, 1920.

Dairying.

HOME MILKING COMPETITION.

The home milking competition, usually carried out in August, during the Show of the Queensland National Association, was proceeded with notwithstanding the abandonment of the Annual Exhibition. The results of the competition on the farms of the competitors were as follows:—

AYRSHIRES.

Anderson, J., Jeanette R. III. of Invercauld, 6.75 commercial butter, 1.
Livingstone, H. McD., Young Duchess 4th, 6.65, 2.
Anderson, J., Garnet VI. of Invercauld, 4.24, 3.

JERSEYS.

Grasmere Stud, Floss 6th of Grasmere, 5.622, 1.
Carr, W. and D., Larkspur (imp.), 5.13, 2.
Grasmere Stud, Golden Lily 4th of Grasmere, 5.015, 3.

MILKING SHORTHORNS.

O'Connor, B., Wakeful of Oakvale, 4.57, 1.
Cochrane, J. F., Orange of Newholme, 3.35, 2.
Cochrane, J. F., Victoria of Dunmore, 3.00, 3.

ILLAWARRAS.

Wade, J. H., Alma of Wadevale, 6.70, 1.
Lawrence, M., Charmer II., 6.07, 2.
Biddles, P., Gentle, 5.37, 3.

GUERNSEYS.

Crowther, G. H., Princess, 3.66, 1.
Crowther, G. H., Ena, 2.68, 2.
Crowther, G. H., Ivy, 2.42, 3.

FRIESIANS.

Hoskins, S. R., Aurora of St. Gwithian, 4.19, 1.
Newman, Geo., Molly of St. Athan, 4.04, 2.
Newman, Geo., Belle of St. Athan, 3.60, 3.

For the special prizes presented by Messrs. Sidney Williams and Co., Ltd., for the cows in the whole competition giving the highest percentage of commercial butter in forty-eight hours:—

Anderson, J., Jeanette R. III. of Invercauld (Ayrshires), 1.
Wade, J. H., Alma of Wadevale (Illawarras), 2.

The necessity of accuracy in making an entry for the competition is shown by the fact that, owing to an irregularity in this respect, the Ayrshire prize would have been won by Mr. F. A. Stimpson's Ayrshire Cow Thyra, her record being 6.88.

HIGH PRICES FOR FRIESIANS.

At a cattle sale at Aylesbury (England), last month, record prices were paid for Friesian cattle, when forty-eight head averaged £524. One imported cow fetched 5,000 guineas and another 3,000 guineas. An English-bred heifer, two years old, sold for 1,650 guineas, another for 1,200 guineas.

PIGS AND THEIR MANAGEMENT.

The dairy industry has made rapid strides, and our butter realises high prices on the home market. Why not make an effort, and try and capture some of the pork trade? There is no spot in the world more adapted to pig-raising than Queensland. We have no severe long winter to contend with, such as in Canada, Denmark, and China; we can breed pigs here all the year round, with little or no shelter, and have many fine winter crops, such as lucerne, rape, &c., on which to graze our herds of swine. With a little judicious management pigs give a better and quicker return than any other class of animal. Brood sows and good sires can be purchased at reasonable prices; they can be cheaply provided for, and in this State they are particularly free from disease.

We have in Queensland to-day, many good pigs of the various well-known breeds, the most popular perhaps being the Berkshire, a pig that has become acclimatised, and suits himself well to the surroundings under which he is kept. In many cases it is wonderful he does as well as he does, under the conditions often obtaining on some farms. It is a symmetrical pig, a good grazer, it fattens rapidly, and if kept growing from its babyhood should be fit for the bacon curer at from 5 to 6 months, and weigh, dressed, 100 to 120 lb. Colour black, with white blaze on face, white feet, and white tips to tail, medium size, head broad and fleshy, well-dished face, thin, pricked ears, rather inclined forward, jowl full and well into the neck; chest wide and deep, back long and straight, rather inclined to arch. (Avoid hollow-backed pigs.) Ribs well sprung, belly full and thick, hams broad, deep and fleshy down to the hocks, legs short and straight; with good bone and well set apart. Action smart and active; a good thrifty, all-round pig.

The Berkshire is a docile, quiet-tempered pig, when properly cared for, and the quieter you can keep your pigs, the easier they are to handle; and quietness is always conducive to laying on of fat.

The Berkshire crosses well with almost any of the other known breeds, especially the Middle White Yorkshire, Tamworth, and Large British Black; for preference, the cross with Middle White Yorkshire. This cross produces good lengthy full-hammed, thrifty, early-maturing pigs. The Berkshire-Tamworth cross makes a splendid bacon pig, early-maturing, good length, strong constitution, and a good meaty pig. In selecting Berkshires, avoid the short lardy pig. Always look for good length, a straight strong back, good full hams, arched strong loin, and a good under line. Berkshire sows are good mothers, fairly prolific, 8 to 10 being considered fair litters. In some cases 12 and 14, but it is better to have a good litter of 8 than of 12. The sow will rear the former well for you, whereas the bigger litter will probably leave you with several runts.

A SUITABLE CROP FOR GRAZING.

Perhaps of all the crops in this State, lucerne ranks first, and Professor Henry says: "Lucerne is destined to become a factor of the greatest importance in pig-feeding operations wherever that wonderful plant will grow."

Lucerne is a most suitable crop for grazing brood sows and young pigs on. Sows grazed on lucerne produce good, strong, healthy pigs, and are in a better condition for farrowing and suckling their young if allowed the run of a lucerne paddock up to the time of farrowing. Young store pigs make rapid growth, forming good bone, muscle, and tissue, when allowed free access to a lucerne run, and fed with a small amount of grain. A lucerne paddock should have had at least three or four cuttings taken off it before allowing the pigs to graze it, as the plant becomes stronger and will stand more than a field of young lucerne. Pigs are particularly fond of lucerne, and it is wonderful how well they will do on it even without other feed.

Green lucerne cut and fed to sty pigs when put in to fatten is greatly relished, and is a valuable adjunct in the mixed ration, as it keeps their blood cool and their digestive organs in order. In a good season pigs will put on condition quickly when running on lucerne, and get very fat; but these are not suitable for producing bacon of the best quality. They must have grain if you want good firm meat and fat.

Green barley, wheat, oats, rye, broad-cast maize are all well suited for grazing on, and well worth your trying for brood sows, weaners, and stores. If allowed the run on these crops they will do well and make good growth; and, if the crops are allowed to ripen, they are still more valuable, as you can run your fatteners on them, or gather the grain, just as you please; but the greater profit will be gained by allowing the baconers to do the harvesting. Maize plots, with pumpkin patches sown between, perhaps make the best fodder areas of all. Mr. Potts suggests planting

some of the climbing varieties of cowpea in the maize rows. This is a splendid idea, as peas are a great addition and furnish the very best of food for producing a high-class bacon. Pigs fed solely on maize in the sty produce an oily fat; but if allowed the run of a maize paddock, they get more exercise, pick up grass roots, weeds, and herbage, and do far better, and produce a firmer, better class of meat and fat. You will probably argue, "Shall I get any better price if I produce this class of animal?" You will say a fat pig is all that is required, but such is not the case. Buyers are always open to give a better price for a good, firm, meaty pig, well topped off, than for a soft, lardy or blubbery pig. Many feeders wonder how it is so many of their pigs go down, or off their legs, when crammed with maize. It is easily accounted for; maize does not produce good muscular development and strong bone, consequently young pigs cannot stand the strain and naturally give way. The remedy, then, is to see they get a good mixed food, such as skim milk, whey butter-milk, peas, sweet potatoes, barley, wheat, oats, pollard, rape, lucerne, or other green feed

DAIRY PRODUCTS AS PIG FOOD.

Skim Milk, Butter Milk, and Whey from Factories.—Owing to the enormous expansion of our dairy industry, these foods are used by nearly every pig-raiser in the State, and form a valuable food when used with other farm products. Skim milk ranks first, being of high value as a flesh-producing food; but to get the best results it should always be fed with grain or pollard. It is not wise to use skim milk straight from the separator. Better let it rest an hour or so, to let the gas work from it. Some farmers prefer sour milk to sweet skim milk, but recent experiments have proved they are of about equal value in feeding. Factory buttermilk is largely used, but care is needed in using it; only the fresh buttermilk should be used, and this should not be allowed to stand any time in a galvanised tank. See that none of the wash water is allowed to be run into it from the factory, as this invariably contains salt, soda, saltpetre, or perhaps other preservatives, which are injurious to pigs. In feeding buttermilk, pollard, barley, crushed wheat, maize, or malt sprouts should be mixed with it, otherwise your pigs will be soft and blubbery.

Whey is only of any value when fed with other mixed foods and grain. If fed alone it is of a poor food value, being about one-half the value of skim milk, and even then it must be fed fresh to obtain this result. Pigs fed on whey can be easily detected by the peculiar odour arising from them. Many become lame, and have stiff joints, when fed solely on whey. An article appeared in the "Grazier" some few months ago, pointing out the number of pigs that suffered from tuberculosis owing to their being fed on dairy by-products, and urging that all skim milk, buttermilk, and whey should be boiled before feeding to pigs. The number of baconers condemned every year by the Government Inspector at our factories is considerable, and amounts to a heavy loss to the curer; and the question here arises whether something more should not be done in having our dairy herds inspected. Tuberculosis is more prevalent in the coastal districts, the Downs and high tableland pigs being practically free from this disease.

Whether your pigs are grazing, or in the pen, see that they get a plentiful supply of rocksalt, charcoal, and wood or coal ashes. It will surprise you to note the amount they will consume. They get a natural craving for them, and must have them if you wish to keep them healthy and give them a good appetite. A dainty pig is never a success; he should be a ravenous feeder, not a pig that sucks up his food but a pig that gulps it up.

BANANA-GROWING AT MOOROOKA.

The accompanying illustrations, supplied to us by Mr. J. E. Friend, who has been for some time growing bananas at Moorooka, a district 5 miles from Brisbane on the South Coast Line, give a good idea of what can be achieved in fruitgrowing, even in poor soils in the neighbourhood of the city, by judicious cultivation, manuring, and irrigation. The soil on which the fine bananas here shown were grown consists of an average of 1 foot of surface soil of a sandy loam nature with a heavy clay subsoil. This has been thoroughly worked and manured and irrigated from a small supply of running water. The first fruit was gathered about December last year, and its excellence was shown by the fact that it fetched 10s. 9d. per bunch, or 10¾d. per dozen in the Roma Street Market, on 26th August last. One of the bunches carried twelve dozen fruits. During the time that the fruit was developing, frosts occurred in June, July, and August, which were especially severe on one or two occasions, although, generally, the mildness of the winter was favourable to the development of the crop.

Plate 21.—Banana-growing at Moorooka.

Tropical Industries.

PROSPECTS OF PLANTATION RUBBER AS A FIELD FOR PERMANENT INVESTMENT.

The present time is, we think, quite opportune to give the views of a well-known member of the London Stock Exchange who has for years specialised in rubber shares, and we consider, therefore, is in a position to speak with true knowledge of the industry and the market. We are tempted to quote largely from this admirable brochure, which has been kindly placed at our disposal.

In considering the rubber planting industry as a field for investment, says a writer in the "Fiji Planters' Journal," it is desirable for purposes of comparison to establish some unit of measurement. What shall it be? The unit most generally adopted in rubber planting circles is the acre of rubber.

An acre of rubber in full bearing yields 400 lb. Well managed companies produce them at 1s. per lb. inclusive of all charges, so a selling price of 2s. per lb. leaves a profit of 400s. or £20 per acre. If it be granted that the rubber planting industry should yield a return of 10 per cent. per annum to the investor, then (if we capitalise on that basis this income of £20 per acre per annum) an acre of mature rubber will fairly represent a capital value of £200, assuming a permanent selling price of 2s. If the price at which we purchase shares represents a purchase of mature rubber at less than £200 per acre, the return on our investment will be proportionately enhanced. Local conditions, of course, may vary. Choice estates will yield as much as 600 lb. at maturity, and poor ones only 200 lb., but, assuming an average of 400 lb. an acre and 1s. per lb. profit on these figures, £200 an acre represents rubber on a 10 per cent. basis.

Perhaps the easiest way to grasp the question of the unit is to ask the question: What does a share in a rubber planting company represent? Let us take a company of £100,000 in £1 shares owning 1,000 acres of mature rubber. Each acre of rubber obviously represents £100 of capital, so each £1 share represents a hundredth of an acre of rubber. A man holding one hundred shares may be regarded as the owner of an acre of rubber.

Now the price at which rubber estates have been planted out and brought to the mature stage varies in a remarkable degree. In times past instances can be found of experienced planters who have achieved this result at £20 per acre. To-day, on the other hand, if a group of ordinary investors were to come together to take up and plant out land they would probably find by the time their rubber was mature it would have cost them about £50 per acre.

The following table will show how great is the variation in capitalisation at par of different companies:—

£1 shares.	Capitalisation per acre at par.
Bukit Rajah	£17
Kuala Lampur	41
Lanadron	57
Tali Ayer	79
Grand Central	90
Seaport	105

2s. shares.	Capitalisation per acre at par.
Cicely	£13
Linggi	14
Vallambrosa	15
Bukit Mertajam	69
Kamuning	83
Sengat	108

Other things being equal, it is obvious that the company with the lowest capitalisation per acre will give the highest return. It is equally obvious that there will be a tendency in the market for the shares of the various companies to attain prices at which the return to the investor will be the same whatever share he buys. But a tendency must not be mistaken for an accomplished fact. With many investors sentiment is as powerful a factor as reason. Investors do not always choose the share which is the cheapest, but frequently that which looks the cheapest to their uninformed judgment.

Suppose, for example, three companies of equal merit each owning 1,000 acres matured rubber. Let A be capitalised at £20 an acre, B at £40, and C at £100. The profit of all three companies (on our previous figures of £20 an acre) will be identical, or £20,000 per annum, but the return will be 100 per cent. on A, 50 per cent. on B, and 20 per cent. on C. Logically, measured by the 1,000 acres of rubber each company possesses, and by the earning capacity of that rubber, the prices at which the £1 shares of A and B ought to stand, if C stands at par, are—A, £5; B, £2; but logical considerations only weigh with some investors, and only partially weigh with others, so it will be found in practice that the share which ought to stand at £5 will very likely stand at £4, and the share which ought to stand at £2 will not stand higher than £1 15s., and the reason is that the £1 share at £1 looks cheaper than the others at £2 and £5 respectively, although in reality it is not.

The writer proceeds to discuss the question of profit thus:—

If the profits on rubber planting be permanent, rubber investments should, we have indicated, go to a 10 per cent. basis. This brings us to the question: Will the present rate of profits be maintained? Must not the return on rubber fall to an ordinary commercial profit?

This question cannot be answered by a simple "Yes" or "No." In theory the answer will be "Yes, ultimately." In practice it will be found that the rubber-producing industry is a peculiar one, embracing factors that tend to postpone indefinitely the "ultimately" that they be at once conceded for the sake of argument. Theoretically, if rubber planting continue to yield a profit of 100 per cent., if rubber be produced at 1s. per lb. and sold at 2s., there will be such a rush of capital into the rubber-planting industry that the result must be a vast increase in production, and a fall in price, with a consequent reduction in profits to an ordinary commercial level. Now capital can be invested in the rubber-planting industry either by the purchase of land and starting of new plantations, or by purchase of shares in existing plantations. It costs to-day (as we have stated) £50 an acre to bring a rubber estate to the producing stage, and for five years the capitalist has to forego all return on his capital. If he can acquire an acre of five-year-old rubber for £100 by a purchase of rubber shares and obtain at once a return of 10 per cent., rising by the end of five years to 20 per cent., per annum, it is obviously a far superior investment to buy shares of existing companies than to go in for a new plantation. Therefore, unless and until rubber shares rise to a level of, say, £150 to £200 an acre, no vast rush of capital into the rubber-planting industry has to be contemplated.

The yield per acre is carefully discussed, and the writer quotes the figures given by Mr. Henry T. Brice in his interesting work in 1911 and repeated in 1914, showing the fair average yields in lbs. per acre for rubber at various stages. Working on these figures the average of 211 lb. an acre all over is arrived at as regards the area planted from 1905 to 1911. Judged by the results of the year 1915 the figures of Mr. Brice are borne out remarkably. A similar calculation for the year 1920 is made out and an average of 385 lb. an acre all over is shown. The presumption is, since the figures in the first table are not continued beyond ten years, that the increase in yield would be 50 lb. per acre every year up to 1920.

The other points touched on and ably discussed are the world's production and the growth of demand. Regarding the latter, the following remarks are made as to America's needs:—

For the past five years the annual consumption of rubber has been allocated, roughly, one half to the United States and one half to the rest of the world. In 1911 the United States took over 46 per cent. By 1915 the proportion had grown to 61 per cent. It is, then, upon consumption in the United States that the future of the rubber industry chiefly hangs. The following table shows how consumption is growing:—

	Increase in World's Production in Tons.	Increases in United States' Consumption.
1911	4,000	2,000
1912	24,000	15,000
1913	9,000	Nil
1914	12,000	10,000
1915	39,000	35,500

The development of motor traction is largely responsible for this. His motor-car hitches the backwoods farmer on to civilisation. The dweller in remote districts soon discovers that his automobile is not a luxury, but the best paying investment he ever made, and it is the thing he cannot afford to give up when hard times compel all-round economy.

If demand in the United States continues to maintain its recent rate of growth (and there seems no valid reason why this should not be the case), then it must assuredly before long overtake the prospective supply.

The following summing up is worthy of repetition.

One closing remark by way of afterword. In uninformed circles it is argued that rubber investment cannot be sound because the return is so high. Now that "highest interest means low security" is a sound maximum, but this applies to borrowers. Planting companies are not borrowers in the sense of the proverb, but are associations of shareholders planting their own land with their own capital. Their investment is with Mother Nature, who rewards her children with no niggardly hand. Moreover, the rubber-planting industry is reaping the just reward of virtue in respect of the sound financial basis upon which the great bulk of the companies were formed. Promoters' profits were small, there is little or no watered capital to pay a return on, so it is natural, right, and just that shareholders should get a large return on their investments on rubber. The rubber market is as safe a one for investment to-day as any other industrial market in the Stock Exchange, and safer than most. It has no troubles to contend with from organised labour; climatic conditions affect it to but a trifling extent. Months of flood or drought involve simply a slight curtailment of crop. Demand for the staple article produced is persistent both in peace and war, for it is a necessity of both. Synthetic bubble after synthetic bubble has been exploded until the present low cost of production of rubber itself is safeguard against even a genuine synthetic product, were one forthcoming. On all of these grounds then the rubber share market is bound to be recognised in the future as a great field for investment, and that of the soundest and most solid description. Either other industrial securities will have to fall in price till they yield as big a return as rubber, or rubber securities must rise till they yield as small a return as other industrial securities. There is no escape from this dilemma. Rubber shares will not continue permanently on a 10 to 15 per cent. basis.—"The Fiji Planters' Journal," May, 1917.

CANE *VERSUS* BEET SUGAR.

A QUESTION OF REFINING, NOT QUALITY.

The "Barbados Agricultural News" has some interesting remarks to make on the use of cane as opposed to beet sugar. As was mentioned in the "South African Sugar Journal" recently, British makers of such commodities as jam, chocolate, and condensed milk have experienced difficulties in the manufacture of those commodities, which they attribute to the use of cane sugar in place of the beet sugar which they formerly employed in their industries.

This is unfortunate, says our Barbados contemporary, as it may lead to some preference being manifested for beet sugar, and to a desire in some quarters to obtain access once more to supplies of continental beet sugar furnished by enemy countries.

It would be well, the "Agricultural News" proceeds, if the facts were carefully investigated, so that the nature of the difficulties may be clearly understood, and steps taken to remedy them.

It is understood that the experience of some makers of jam and condensed milk is that their goods manufactured with the class of cane sugar recently available exhibit a tendency to ferment. This defect cannot be attributed to the sugar as sugar, for it is admitted that pure cane sugar and pure beet sugar are identical substances. The defects, therefore, must lie with such impurities as were contained in the sugar used.

Owing to the fact that the impurities of ordinary beet sugar are extremely unpleasant, having an offensive taste and smell, it is essential that the refining of beet sugar shall be very thoroughly accomplished; if not, the resulting sugar is unpleasant, and is not acceptable to the user.

On the other hand, the impurities incidental to cane sugar are quite pleasant both to smell and taste; consequently, cane sugar may be passed on to the market in a less perfectly refined condition than beet sugar, and still be acceptable to the ordinary user. Indeed, there are many grades of cane sugar in common use which are not refined sugars in the strict sense of the word; they are made direct from the cane juice by careful methods, without being submitted to refining processes.

It is more than probable that the manufacturers' difficulties referred to above are to be explained by the fact that the cane sugars recently placed at their disposal by the authorities regulating the supplies of sugar-cane were cane sugars which had not been submitted to a thorough refining process, such as results from treatment with animal charcoal.

In such a case it is conceivable that organisms capable of causing fermentation exist in the sugar, and so pass into the products of manufacture, ultimately leading to their spoiling. Had the sugar been thoroughly refined, preferably by filtration through animal charcoal, it is expected that these fermentive organisms would have been removed. This being so, it may be asserted that it was not the sugar that was at fault, but its method of refining.

It is well known that in the stress of recent times one difficulty experienced in Great Britain was the obtaining of refined sugar, so much so that unusual steps had to be taken to get supplies of sugar refined in America for British use; British refineries were too few in number and too small in capacity to produce the needed quantities. It will be readily recognised that these conditions were conducive to the furnishing of only partially refined sugars to the manufacturers of jams and condensed milk.

This recourse to American refineries is a consequence of the fiscal policy before the war which led to the closing of almost all British sugar refineries, thus putting a stop to an industry which in the earlier part of last century was of great importance in the United Kingdom. From those extinct refineries, before the swamping of the market by refined beetroot sugar from the continent, there used to be produced sugar of the utmost purity, in loaves and cubes and crystals, much of it refined from crude cane sugars from the tropical parts of the Empire.

That this use of imperfectly refined cane sugar may have been the cause of the troubles complained of is rendered fairly evident by the statement of a manufacturer of chocolate, to the effect that he preferred beet sugar because it is less sticky than cane sugar. Now thoroughly refined cane sugar is no more sticky than is beet sugar, so it must be concluded that his experience referred to the imperfectly refined cane sugar.

In the work of reconstructing industries after the war sugar will play a large part, and the question of the production of cane sugar will be a vital one for many of our colonies. Sugar production in British colonies has been at a great disadvantage in the past in its struggles to compete with beet sugar, a struggle which hinged, not so much upon the qualities of the respective sugars, but upon the fiscal conditions under which they were produced and marketed.

Now that these disabilities are to be removed, it is very undesirable that any undeserved stigma should attach to cane sugar, or that there should arise a preference for beet sugar, on the part of even some British manufacturers, based on erroneous grounds. A body of prejudiced purchasers in the United Kingdom might be a source of serious danger to the colonial sugar industry.

It would be an acceptable and useful national service if one of the associations now springing up in England for the development of the colonial sugar industry, and the investigation of sugar problems, were to take up this question and investigate it thoroughly and to give wide publicity to the results of the investigation as soon as possible.

It is to be remembered that in the consumption of sugar in the major industries concerned with the production of jams, confectionery, condensed milk, and allied commodities, a very large part of the sugar imported into the United Kingdom is used; consequently, anything working to the detriment of cane sugar in this connection is a matter of grave concern.

Mere declamation, or the assertion of the merit of one kind of sugar as contrasted with another, will not suffice; the matter should be thoroughly and carefully investigated.—"South African Sugar Journal."

SISAL HEMP.

We have received inquiries from several returned soldiers as to the advisability of engaging in sisal cultivation. A few notes on the past and present positions of the industry in Queensland will therefore not be out of place. About the year 1904, and even earlier, attention was drawn to this product by various agricultural writers, and with a view to supplying plants of the true Mexican sisal (*Agave rigida*) a few acres were planted at the Penal Establishment at St. Helena. (The plants were imported by Mr. Peter McLean, then Under Secretary for Agriculture.) These rapidly increased, and several thousands of suckers were distributed to intending growers. In 1890 phenomenal prices were obtained in America and Europe for the fibre, which was in great demand for the manufacture of binder-twine, and prices

rose owing to the alarming decrease in the production of Manila hemp or banana fibre (*Musa textilis*) in the Philippine Islands. The ever-increasing demand, with which the production was unable to keep pace, and the expansion of the wheat-growing industry, for which millions of pounds of binder-twine are needed annually, tended to show that those entering upon the sisal industry could not fail to reap a rich reward.

In addition to the thousands of plants distributed from St. Helena, sales were effected by private growers. Between 1904 and 1910 the writer disposed of nearly 300,000 suckers and 200,000 bulbils to intending growers in many parts of Queensland, New Guinea, Fiji, South Africa, the Solomons, &c., &c. In those days there was little trouble on the score of labourers' wages, which, whilst being reasonable, enabled the planter to obtain a fair profit for his enterprise. As time went on and the price of machinery became a serious item in the expenses, and the demands of labour as to wages increased, the sisal planters gradually gave up the industry. The price of the fibre locally was about £25 per ton, and the cost of production about £12 per ton. Eventually the two factors—*i.e.*, cost of machinery and high wages—effected the ruin of the sisal industry. Some farmers who had rooted out sugar-cane to plant sisal then reversed the order, and other crops supplanted the sisal.

During the late war the price of sisal fibre in England rose to £200 per ton. But there were no means of shipping it to England even had the plantations with machinery continued to produce the fibre, and only a comparatively small quantity found a local market.

For the whole duration of the war immense stocks of sisal were held in Yucatan, the Bahamas, Mauritius, Java, &c., ready to flood the markets of the world. Large stocks of Mexican sisal are also held in the United States. The close of the war resulted in a heavy fall in prices. From £200 per ton in 1915 there was a decline to £65 per ton in 1918. In June last, however, stocks were largely depleted, especially in East Africa, and prices remained firm at £69 to £70 per ton.

Sisal is not a crop which can be profitably grown on small areas, owing to the great cost of the necessary machinery. This might be overcome by the establishment of a central mill. But here, again, the heavy cost of cartage to and by rail is a bar to success. Conditions in regard to this industry have so completely changed during the last few years that we would not advise anyone to take it up who intends making a living on a farm. Cotton should be grown for preference.

TO RUN OUT A COIL OF BARBED WIRE.

Those who for the first time use barbed wire for fencing sometimes have difficulty in preventing it kinking. Mr. G. Lloyd Apjohn, Townsville, sends along the following plan of running it out on the fence line without assistance:—Place the coil of wire on the ground, and fasten the end of the wire to the post. Then pass a stout stick through the coil to act as an axle and tie a rope to each end of it. Then walk away with the coil, which will reel off of itself, wheel fashion. In this way the wire may be taken across logs or round corners, so that instead of being a difficult job, the work is easy.

TREATMENT OF COTTON SEED BEFORE SOWING.

The Manager of the State Farm, Roma, has forwarded a sample of cotton seed to the Agricultural Department, which seed has been specially prepared to admit of sowing by means of a seed drill. In commenting on the matter, the Director of Agriculture states that the fluffy fibre adhering to Upland cotton seed after "ginning" and "linting" causes the seeds to bunch together, which means that the sowing has to be done by hand, which is a tedious process. This latter difficulty has now been overcome by treating the seed with fine puddled clay, which envelops the loose fibres and leaves the seed in a smooth rounded form, in which condition, after drying it will readily pass through the drill—a process calculated to reduce the cost of planting operations.

Illustrations of the seeds, prepared and unprepared, will appear in the next issue of the Journal.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

No. 16.

A "RATTLE POD" (*CROTALARIA SERICEA*, RETZ).

Description.—An erect undershrub of 2 to 3 ft. or more. Stems ribbed, usually with a purplish bloom. Leaves obovate-lanceolate, the apex apiculate, glabrous above, clothed with fine, silky hairs beneath, 1½ to 3 in. long (the lower leaves on old plants much larger), stipules persistent, conspicuous. Racemes of flowers attaining over 1 ft. in length. Flowers yellow, large (about 1 in. across), bracts large (up to ½-in. long), ovate, pedicels as long as, or longer than, the calyx. Pod stalked, much inflated, 1½ to 2 in. long, seeds numerous, brown, and glossy, somewhat kidney-shaped.

Distribution.—A native of India; it is a very common weed in Queensland, being found along the coast from Brisbane to the far North, but difficult to say whether native or introduced, though the collecting of specimens from such distant habitats as Newcastle Range (A. H. Blackmann) and Bloomfield River (Rev. W. Poland) would point to the former.

Botany.—This plant for some years went, in Queensland, under the name of *Crotalaria alata,* and under such, F. M. Bailey ("Queensland Flora," p. 372) referred to it as "Naturalised in many localities," and also (Annual Rept., Dept. Agric., Brisbane, 1891-2, p. 49) as "A naturalised plant from India, suspected of poisonous properties in some localities." The true *C. alata,* however, is a very different plant, with broadly winged stems, due to the conspicuous broadly decurrent stipules of the leaves. *C. sericea* is very closely allied to *C. retusa,* a species fairly common in North Queensland and the Northern Territory, but differs from that species in the conspicuous, persistent stipules of the leaves, and in the large broad bracts subtending the flowers.

Properties.—It is a showy, rather attractive plant. A record of it as a suspected stock poison has already been referred to. Though not definitely proved to be poisonous, and though very rarely touched by stock, in view of the fact of the well-known poisonous character of some of the genus, it may be well to cut it out from paddocks where stock have access.

Eradication.—Though abundant, it cannot be said to be an aggressive weed and should not call for any particular methods of eradication where it becomes necessary to get rid of it.

Plate 22.—A Rattle Pod (*Crotalaria sericea*)—flowers yellow.

A.—Flowering shoot. B.—Pod. C.—Seeds. All natural size.

Entomology.

INSECTS ATTACKING PEANUTS IN QUEENSLAND.

By EDMUND JARVIS, Assistant State Entomologist.

Although little or nothing has hitherto been published with regard to the insects affecting peanuts in Australia, we shall probably find in future years, when they come to be grown extensively, that various indigenous species will develop a liking for this crop in the field, while others, including introduced cosmopolitan pests of more or less economic importance, will doubtless attack the stored nuts, oilcake, &c.

The Queensland insects described in this article were noticed by the writer at Meringa, near Cairns, affecting some peanuts grown for home use, of the variety known as "Spanish."

The only one occasioning decided loss in the field was a mealy bug on the nuts, which has accordingly received illustration. (Plate 23.)

The remainder (excepting *Isoden puncticolle* and possibly *Chloridia obsoleta*), although of comparatively minor interest at present, have not, I believe, been previously recorded as being injuriously associated with this plant.

INSECTS AFFECTING THE LIVING PLANT.

Pseudococcus sp. (Family, Coccidæ).

About 30 per cent. of the crop was found to be more or less infected by this insect.

In some cases, most of the nuts on individual plants had perished, the blackened shells, where partially hidden under white mealy powder, being of a purplish colour, while the foliage appeared stunted and unhealthy looking.

This crop, which had been in the ground about five months, was planted at the end of December on red volcanic soil, and throughout January and most of February growth had been somewhat checked owing to dry weather. On the 23rd of the latter month heavy rain set in, and during March and April the plants grew rapidly.

The mealy bugs occurred on the roots and underground portions of vines at a depth of from 1 to 4 in., and were congregated in thousands on the nuts, so thickly at times as to completely hide the shells from view. They were of all sizes, from tiny larvæ to adult viviparous females of the summer brood, measuring about 3 mm. in length (⅛-in.).

Before describing the species, it may be stated, for the enlightenment of readers not familiar with this class of insect or the technical terms associated with it, that mealy bugs, being covered with powdery or flocculent secretion, cannot be satisfactorily identified until such obstruction has been removed. This is effected very simply, either by placing the insect in chloroform for a few seconds to dissolve the wax, or passing it quickly once or twice through the flame of a small spirit lamp. The true colour is then apparent, and after preparing and mounting the specimen in balsam, one is able, with the aid of a microscope, to examine structural details.

Specific differences occur principally on the pygidium, a term used to denote the surface of the extremity of the anal or last abdominal segment. The form and position of various tubercles, and the often fanciful arrangement of pores and bristles on this portion of the body, vary somewhat in different species of mealy bugs. Other distinguishing features are found in the number and length of the antennal joints, structure of the legs, &c.

IDENTIFICATION OF THE SPECIES.

In general appearance this insect is not unlike our common citrus mealy bug (*Pseudococcus citri*, Risso), but upon close inspection, one notices specific differences in colour and vestiture.

Having examined mounted specimens, I find that this peanut mealy bug is very close to, if not the same with, *P. trifolii*, Forbes, an insect previously described from South America, where it chiefly affects the common red clover *Trifolium pratense*.

Its occurrence in Queensland on *Arachis hypogæa*, a closely related leguminous plant, has not, I believe, been previously recorded.

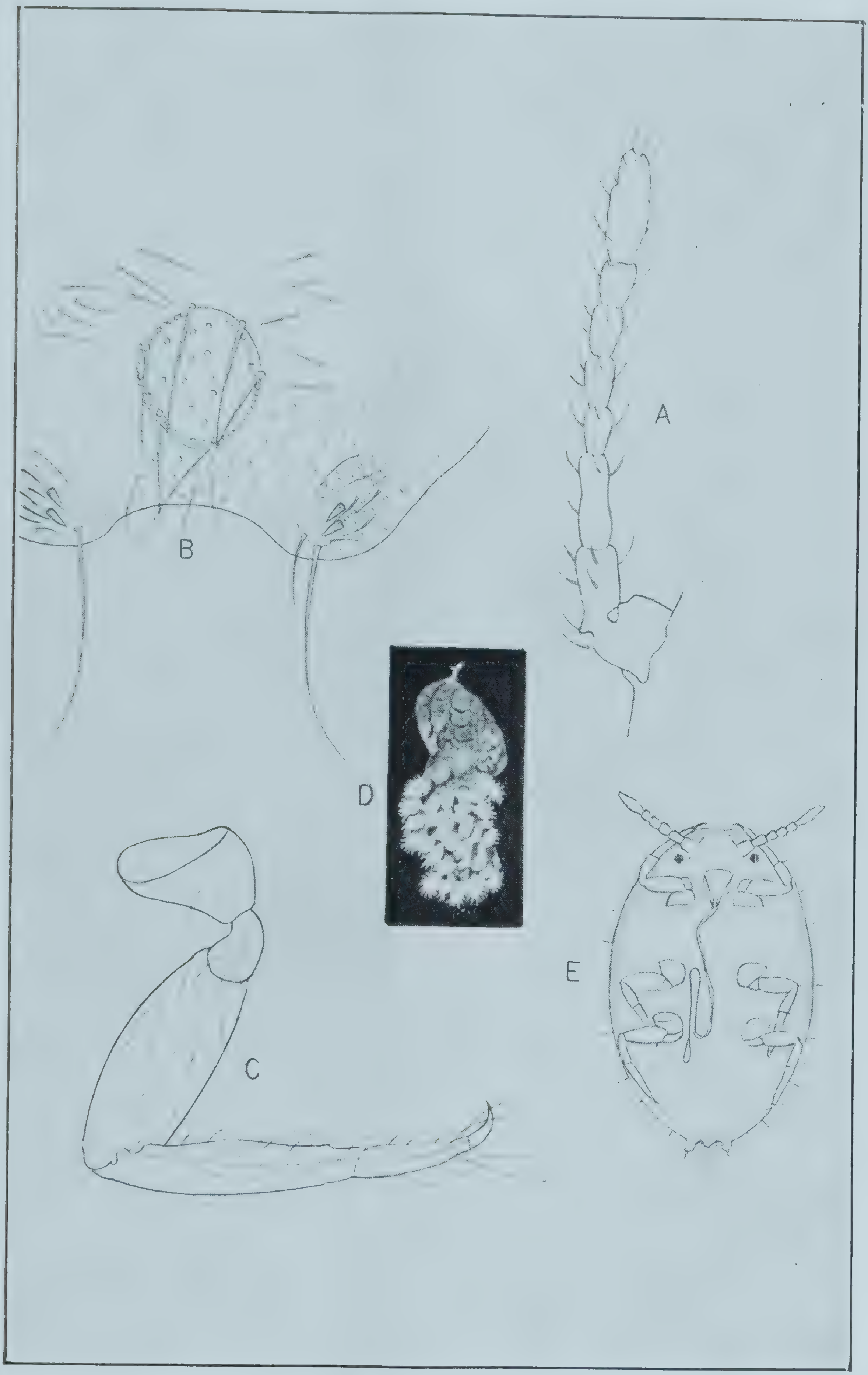

PLATE 23.—PEANUT MEALY BUG.

A.—Antenna of Summer Female. B.—Pygidium of same. C.—Hind leg of same.
D.—Mealy Bugs attacking peanut (natural size). E.—Larva. (All drawings original).

THE LARVA.

In the few specimens of this stage examined the antennal articulation may be expressed by the formula—6, 2, 1 (3, 4, 5).

The anal tubercles are rather prominent, each bearing two short, acutely conical processes, about five times longer than their basal width. The femur of the hind leg is decidedly longer than the tibia, and the tarsus slightly exceeds the femur in length.

NOTES ON THE SUMMER FEMALE.

The adult female is dark reddish-yellow (in *P. citri* the body colour is pale ochraceous), very convex above, flattened beneath, and covered with a white powdery secretion that, whilst partly hiding the true colour, allows the segmentation to be clearly seen. The waxy filaments fringing the sides number from 16 to 17, those on the hinder segments being longer than the others. At the tail-end there are usually from four to six of about equal length, two or four of which sometimes measure from one-quarter to half the length of the body. All these lateral filaments are generally cylindrical, straight, and practically filiform, while in *P. citri* they are somewhat flattened, distinctly broader at the base, slightly flocculent, and inclined to curl at times. The above distinctions, together with the absence of a brownish mid-dorsal band occurring in *citri*, will serve to separate the females of these mealy bugs.

Both have eight-jointed antennæ, but in my species the formula for the joints (from eye measurement of a few specimens only) appears to be -8, (2, 3,) 1, (5, 6, 7) 4; while the articulation in *citri*, according to Essig,* is -8, 3, (1, 2, 7,) (5, 6,) 4. In all the peanut coccids examined by me the fourth antennal joint was noticeably shorter and narrower than any of the others. (Fig. A.) The anal tubercles (Fig. B) bear one long spine and a group of seven smaller ones surrounding the two conical processes. Numerous circular pores are scattered over the surface of the pygidium (Fig. B), and a number of spines in positions shown on drawing. The six circumnal spines are half the length of those on anal tubercles. The femur and tibia of the hind leg are of equal length, the tarsus about half as long as the tibia, and terminating in a simple curved claw (Fig. C). The four digitules are exceedingly slender, but clearly distinguishable in well-mounted specimens. When fully grown, the body of this mealy bug measures about 3.50 mm. in length, and is equally rounded at each end.

(2.) Leaf-Eating Caterpillar (Family Pyralidae).

Larvæ of this Pyrale moth were observed during March webbing the foliage together, and feeding under such cover on the young shoots and unfolding leaves.

THE CATERPILLAR.

Shining greenish-brown, with three dorsal, two subdorsal, and two spiracular, longitudinal yellow lines; those on spiracular area broadest. Each segment marked with eight to twelve black, shining tuberculate spots, each emitting a single black hair. Head and first body segment pale green, the latter with a large brownish-black blotch on dorsal area and the former edged behind with black. Ventral surface dull green, prolegs and claspers black. Length 16 mm. ($\frac{5}{8}$ of an inch).

The pupal stage of this insect occupies a period of about two weeks.

Unfortunately, the only specimen of the moth obtained was eaten by a cockroach before identified. From its general appearance at the time of emergence I believed it to be a species of *Glyphodes* or closely related to that genus.

A small caterpillar tunnelling into the ends of the stems has been recorded as injurious to peanuts in St. Vincent.

(3.) Laelia, sp. (Family Lymantriadae).

Specimens of this moth were bred during February from larvæ found devouring the foliage.

THE CATERPILLAR.

Light yellow, blotched with pale reddish-brown on dorsal surface, the blotches outlined with white; sides of body segments ornamented with two detached lateral white dashes. Segments 4 to 7 with a dense compact golden tuft of hairs rising vertically from dorsal area, and nearly one-eighth of an inch in length. Head pinkish, a pencil of grey hairs about a quarter of an inch long and feathered with black at the tips projecting laterally from each side, and two similar pencils arising close to anterior dorsal edge of anal segment, projecting caudad. Sides of body fringed with long white hairs. Length $1\frac{1}{2}$ in.

* "The Citrus Mealy Bug," Pomona, "Journal of Entomology," Vol. II., No. 4, December, 1910.

THE PUPA AND MOTH.

On 3rd February one of these caterpillars spun a flocculent pale-yellow cocoon on the side of its breeding-cage, through which a brownish pupa was plainly discernable.

The imago, which emerged twelve days later, was identified by Lyell as a species of *Laelia*. Although a common enough caterpillar here, the moth happened to be new to his enormous collection, being probably one of those species that are rarely obtained unless bred from the larval form.

DESCRIPTION.

Fore wings pale-buff, marbled with light brown; a broad band of the latter colour, widening towards costa, and edged outwardly with paler buff, crosses wing about parallel with outer margin; the inner edge of this band, lying in middle of central area, adjoins a pale blotch enclosing 2 to 4 dark lunulate dashes on subcostal portion. Fringe of outer edge blotched with brown, and just inside is a broken line of dark marks close to outer edge of wing. Upper surface of hind wings and under surfaces of both pair chalky-yellow, with a suffused brownish blotch on costa of forewings near tip. Expanse of wings 44 m.m. ($1\frac{3}{4}$ inches).

(4) Chloridia assulta Gn. (Family Noctuidae).

Caterpillars of this insect were fairly common, inflicting injuries to the young leaves and softer portions of stems.

THE CATERPILLAR.

When about half an inch long the larva is not unlike that of a pyrale in general appearance, being light greenish-yellow with numerous small pustulate brown dots; and at this early stage, in addition to eating the unfolding leaves, it bores the ends of the stems.

The fully grown caterpillar is light greenish-brown with mid-dorsal thin stripe consisting of a thin yellow line edged on each side by dark-brown; subdorsal area suffused reddish. Each segment marked with wavy, longitudinal, yellow lines more or less interrupted.

Spiracular band reddish-green bordered with bright yellow. Body spotted with numerous black, shining, convex tubercles, smaller and in a transverse row on thoracic segments, and irregularly disposed on abdominal portion, each tipped with a white hair. Centre of subdorsal area of abdominal segments with a small spot of rusty red just above each spiracle. Head ochraceous, spotted with light yellow. Venter pale greenish-yellow speckled with white. Length 42 m.m. ($1\frac{5}{8}$ inches).

Like many noctuid larvæ, it has a habit, when handled, of assuming a twisted hooklike form, and remaining motionless until believing the danger past.

THE PUPA.

The pupal condition lasts for about two months, a caterpillar that pupated underground on 4th March transforming to the moth stage sixty days later.

THE MOTH.

The imago very closely resembles that of our common cutworm of the tomato and other vegetables *Chloridia obsoleta,* better known under the synonym *Heliothis armiger.*

(5) Chloridia obsoleta (Family Noctuidae).

A few caterpillars, of the green variety, of this familiar cutworm were observed slightly injuring the young leaves.

(6) Atractomorpha crenaticeps, Blanch. (Family Acridiidae).

(7) Cyrtacanthacris sp. (Family Acridiidae).

The above grasshoppers cause minor damage to the foliage.

The former (*A. crenaticeps*), which is the more plentiful of the two and much in evidence throughout the summer, has been described and illustrated by the writer in Bulletin No. 3 of Queensland Bureau of Sugar Experiment Stations; Division of Entomology, 1916.

(8) Isodon puncticolle (Family Dynastidae).

Specimens of this Scarabaediae beetle were recorded by Tryon* in 1915 as occurring at Sandgate "damaging the plants as adults, cutting off the stalks at about 2 inches beneath the surface."

INSECTS ATTACKING THE STORED PEANUTS.

(9) HOMOEOSOMA VAGELLA, ZELL. (FAMILY PHYCITINAE).

This moth was observed infesting a parcel of nuts ("Giant Peanut") procured from Cairns about Christmas time.

The larvæ feed on the kernel, and when fully grown leave the pods and pupate outside in silken cocoons under a mass of webbing covered with excreta.

DESCRIPTION OF MOTH.

Fore wing silvery-grey, irregularly speckled with brown, and having a few obscure blotches of same colour arranged in the form of a broad transverse bar on outer edge of basal area near centre of wing; a nearly central blotch midway between this bar and apex, and a few other indistinct smaller marks on middle and outer areas. Scales fringing outer border, brown, tipped with white. Hind wing whitish, apical area somewhat suffused with grey; edges and nervures outlined in brown. Expanse, 16 m.m.

(10) TRIBOLIUM FERRUGINEUM, FAB. (FAMILY TENEBRIONIDAE).

This cosmopolitan pest of flour and other stored products is a slender reddish-brown beetle about 3/16 of an inch long, of a depressed and almost oblong form. It was found plentifully among the stored nuts.

Tribolium confusum, Duv. which closely resembles the preceding species in size, appearance, and habits, has already been recorded as injurious to peanuts in America.

(11) CARPOPHILUS SP. (FAMILY NITIDULIDAE).

A number of these beetles were attracted to some dried peanuts stored indoors in a tin box. They probably feed on the broken nuts, debris, &c.

DESCRIPTION.

Dark brown, covered with golden pubescence; the basal and central portions of elytra more or less clouded with obscure reddish. The punctures on upper surface shallow and flat-bottomed. Hairs on pronotum radiating fanwise from centre of hind margin. Head and pronotum taken together are about the length of elytra, and the two uncovered abdominal segments the length of pronotum. Legs reddish-yellow. Length of body, 3 x 1.20 m.m.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report on Cane Grub Investigation from Dr. J. F. Illingworth:—

"The long-continued shipping hold-up has had a serious effect upon my investigations. Not only are visits to other localities curtailed, but I am unable to get supplies necessary to start an extensive line of new experiments at Greenhills.

"The weather has continued very favourable to harvesting in the Cairns District, and most of the grub-infested fields have been cut, with fair averages, since little of the cane fell over and deteriorated.

"Looking forward to the next flight of the beetles, I want to make every preparation. I am experimenting with soluble arsenic for killing feeding trees; and in this report I want to make some recommendations in regard to the continuing of the Beetle and Cane Pest Destruction Funds in the various districts affected.

"DESTRUCTION OF FEEDING TREES.

"As is well known, the practice of ringbarking will kill most trees, if done at the right season, but, ordinarily, many of our Eucalypts have a decided tendency to sucker from the roots and the portion of the stump below the cuts. I found this to be the case in a paddock of 5 acres, which I had ringbarked during February of this year. The cuts were made about 30 inches above the ground; and while a few of the weaker trees have already succumbed, by far the greater number have ratooned vigorously from the portion below the wounds. Constant removal of the suckers is a serious undertaking on a large area, so I have turned my attention to a quicker though more expensive method of destroying the foliage.

* Annual Report of Entomologist and Vegetable Pathologist, Department of Agriculture and Stock. Queensland, 1914–15.

"I found a rather extensive literature upon the subject of using soluble arsenic for killing trees in Australia; and this I have made use of in our experiments. The quickness of results is very satisfactory where one wishes to deaden the foliage and prevent suckering.

"We tried a number of methods of applying the poison to determine which was most effective and at the same time economical. Undoubtedly, the best results are obtained by ringing as close to the ground as possible, letting the cuts overlap, so that no portion of the bark remains uncut. A comparatively small amount of the poison is necessary, only enough to thoroughly wet the cut surfaces of the wound—a half-pint being enough for a tree six inches in diameter, while a large tree of three feet diameter requires about half a gallon.

"Suckers from old stumps are easily destroyed by cutting into the live wood and applying a small quantity of the poison. Apparently the killing action extends downward for a foot or more below the point of application. This feature of the problem will be exceedingly useful; anyone who has attempted to clear land covered with a forest of Eucalpyts knows how difficult it is to keep the old roots from sprouting.

"It is best to use a strong solution, for with much dilution the action is not only slow, but the trees in many cases revive. The mixture that gave best results was—

Arsenic, one pound;
Washing soda, two pounds;
Water, one gallon.

With this strength a great deal of the weight of excess water is done away with, and by careful handling, the same amount of ground can be effectively covered.

"BEETLE AND PEST DESTRUCTION FUNDS.

"Vast amounts have been expended through these funds in the various districts for the destruction of grubs and beetles. Hence, from time to time, my opinion has been sought as to the efficacy of this measure. Since I have gradually changed my views as data has accumulated, I desire to again bring the subject before the growers.

"I do not now favour the hand-collection of beetles and grubs because of the expense. However, if some method were devised of securing them at a very small outlay, it might be a profitable procedure. It certainly proved so in Denmark in 1887, when practically all the beetles in the country were collected at an expense of about 1s. to 1s. 10d. per lb.; but this is out of the question under our present conditions.

"One would naturally conclude that every female beetle destroyed before ovipositing would have a beneficial result in the lessening of the pest. Yet we must consider that the grub pest is not primarily located in cane areas, but that this insect is indigenous on the wild grasses; and that those collected in cane areas are such a small fraction that there is no noticeable decrease from our efforts.

"I find that the Cairns District, in 1910-11, collected 22 tons of beetles and 9 tons of grubs, at an expense of about £3,000, and there was no apparent decrease the following year. Furthermore, I made a careful study of the figures of other districts, some of them extending back twenty years, and the results are invariably the same. Wherever there was a marked decrease in the pest, it was due to severe drought or other natural causes.

"Let me say, however, that I am not in favour of doing away with Pest Destruction Funds, for they can be of material assistance in coping with the pest in other ways and in experimentation.

"I am confident that this money could be profitably used in many districts in the removal of feeding-trees for about half a mile to windward of cane areas. This co-operation is necessary to cope with the pest; and the results will be far-reaching, for they will affect every grub-infested region.

"Furthermore, we need many centres of experimentation if we are to secure speedy results, and these could be profitably carried out in the various districts, under the advice of this office. Let me urge that where Pest Destruction Funds have become defunct to revive them and make them work overtime, until the worst pest that ever attacked a field crop is down and out.

"GRUB CONTROL BY PARASITES.

"I recently had a letter from Mr. Frederick Muir, of the Hawaiian Planters' Association, who has again arrived in Australia on a quest of friendly insects. Knowing that I wished to introduce some of the wasps, *Scolia manilae,* which have proved so effective in eradicating the two small species of white grubs in Hawaii

since their recent introduction there, he writes, that he got together a cage of some 600 females from the field to bring along. They kept in good condition until he reached Auckland, where the strike tied up the boat for two weeks. This proved too much for the poor creatures and they all died. This attempt, though unsuccessful, indicates the generosity of both Mr. Muir and his association in their desire to assist us in our need. As he says, we must try again; suggesting that the Oceanic boats will be best to bring them on.

"In a letter which I have just received from the Government Entomologist of Mauritius, there is considerable encouragement on this subject. He writes as follows:—

" 'As far as the control of white grubs is concerned, I can tell you that there exists in Madagascar two species of *Lepidiota*—*Lepidiota lactea* and *Lepidiota pyngidialis*—and several scolids of the size of *Campsomeris tasmaniensis*, so that it is quite possible that you might find there parasites against your *Lepidiota*.

" 'The only method which I recommend is that of catching the wasps and then breeding them in special cases amply furnished with grubs in the soil. The wasps are easily fed during transit with honey; the grubs supplying the necessary material for their reproduction.

" 'The above is the method which I employed for introducing *Scolia oryctophaga* from Madagascar, and it has given me entire satisfaction.

" 'The practice of sending cocoons in damp earth and moss cannot be relied upon. From experience in dealing with importation of scolid wasps, I can tell you that cocoons removed from the earth cells in which they had been spun and sent to long distances never hatch out. They must be spun in the case in which they are to travel and should not be disturbed before their destination is reached; hence the necessity of breeding the parasites in cases containing soil amply furnished with grubs.

" 'Even if the pupal stage of the wasp is less than the time taken to reach destination, the wasps can hatch out and reproduce in transit. Copulation does not seem to be absolutely necessary, for females of *Scolia oryctophaga* have reproduced parthenogenetically in the insectary here.

" 'I do not think that the species existing in Mauritius can be of any use against the Australian cane grubs. You might, perhaps, find these in Madagascar, but when the nature of the country is considered, and its distance from Australia, together with the difficulties of direct and rapid communication, the question would seem not an easy problem.

" 'You must have received by now the Bulletin I sent you—"Importation of *Tiphia parallela*"—in which you will see that attempts to introduce *Tiphia* here, in the pupal stage, have failed.

" 'I am of opinion that much better results might be obtained if better conditions, in the shape of special feed plants for the scolids, were created all along the infected fields. This would congregate in large numbers the parasites and render their action more efficient. The results obtained here, as far as *Tiphia* and *Elis* are concerned, are undoubtedly due to the food plant being extremely common all over the infected area. I am certain that you will greatly improve the present conditions in trying the above suggestions.'

"On the matter of feeding plants for the parasitic wasps, I must state that I have just received a nice fresh supply of the seed of pigeon-pea, generously collected by Mr. E. Freeman, Cane Inspector at Victoria Mill. The flowers of this pea are a favourite for both bees and wasps; hence, I am anxious to grow the plants along the margins of infested areas, as an inducement to the wasps to congregate in these centres.

"THE LANTANA SEED-FLY.

"This tiny Agromyzid fly continues its effective work in the destruction of practically all of the seeds of the troublesome weed *Lantana camara*. I have made some careful experiments to determine the percentage of seeds that would germinate without getting any to show life.

"It will be recalled that the flies were liberated here at Gordonvale, in March, 1917, after their arrival from Hawaii. They quickly became established and widely spread—in fact, they are now in practically every lantana-infested district of North Queensland.

"Recently, in collecting berries for examination, I found it a difficult matter to get any that had remained on the bushes long enough to become mature and ripe. The maggots working inside the kernel cause the fruit to drop easily at the slightest jar; hence, one finds most of the receptacles empty. The few scattered ripe berries were collected and placed in germinating trays without result.

"Microscopic examination of these kernels dissected showed that in every case the seed had been eaten out. Apparently, the kernel of lantana originally developed three seeds, but by a process of evolution two of them have become so small that they do not germinate; they are only rudiments, made up of endosperm. In about 10 per cent. of the kernels examined the maggots had failed to destroy these rudimentary seeds, probably because they are encased in a particularly hard portion of the pith.

"Although I was unable to get any results from these examinations, the flies must inevitably miss a few of the seeds, which accounts for the very slow spread of this pestiferous plant. If it is desired to rid a district of lantana, the flies must be given a hand by cutting out the old bushes and whatever new ones that spring up along fences, &c., where birds have dropped the seed."

Science.

CONSERVING WATER.

The first public lecture under the auspices of the Queensland Popular Science and Art Society was given in the Education Hall on the 16th September, by Mr. R. A. Wearne of the Central Technical College. The following synopsis of the lecture, which was preceded by a short description of the geological history of South-Eastern Queensland, appeared in the "Daily Mail" of 17th instant:—

"Queensland has been more bountifully blessed by nature than any of the other Australian States," said the lecturer. "Her dormant agricultural and mineral wealth is untold. The whole coastal and uplands districts are eminently fitted for intense cultivation. What is required is population to till those lands, and facilities to induce sufficient population to take up the present idle wastes. A farmer cannot be expected to travel 11,000 miles to take up land where periods of excessive drought will swallow up the earnings of his hard-earned toil. The land is here craving for the plough; the rainfall is here craving for conservation; and the farmer is craving for irrigation.

"Australia's continental configuration, her coastal ranges, and the absence of highlands in the interior enforce, as a *sine qua non,* periods of excessive drought such as in 1902 and 1915 and 1918; and periods of excessive drought can only be combated by water conservation and irrigation. The main factors for successful irrigation are an adequate annual rainfall for conservation, water conservation in the foothills of the uplands, and land suitably situated with respect to the area in which the water is conserved, with a fairly even surface and soil adapted for irrigation. Queensland possesses a main dividing range and extensive uplands running parallel to the coast throughout its extreme length. The annual average rainfall over this region ranges from 39 inches in the south to 100 inches in the north. Beautiful extensive alluvial, naturally graded flood plains extend from the coast to the very foot hills of the main range. The slope from the escarpment of the uplands to the coast is gradual and uniform, and a large portion of the surface is level. The coastal district of Queensland is thus ideally constructed by nature for successful irrigation.

"The Fassifern district is one of the most suitable areas in Queensland for irrigation on an extensive scale. River valleys filled with the most fertile soil and separated by wooded sheltered ridges penetrate to the very base of the Main Range. Dame Nature has lent a kindly helping hand. The whole of the eastern coast from the main range to Brisbane has been faulted to an extent of at least 1,500 feet. This coastal faulting and subsequent erosion have produced natural V-shaped reservoirs on the eastern flank of the Main Range, which require but the assistance of man to conserve an unlimited supply of water suitable for domestic and irrigation purposes and hydro-electric scheme.

"Irrigation without water conservation must prove a failure. In periods of drought, when the demand for water is at a maximum, the supply falls to a minimum. In periods of flood, unlimited quantities of water are borne seawards. The conservation of this supply is absolutely necessary for any tangible scheme of irrigation. The State Treasurer has already visited the area at Mount Edward, and a permanent survey is now being made by Mr. Deshon and his staff. On behalf of the local settlers, I thank Mr. Theodore for carrying out the promise made during his recent visit of inspection."

The lecture was splendidly illustrated with lantern slides.

THE "ALICE DANIELS" POTATO DIGGING MACHINE.

For the past thirteen years Mr. Henry Daniels has devoted himself to the task of perfecting a potato-digging machine which should satisfy potato growers in all that concerns the harvesting of the crop with the greatest celerity, combined with economy and effectiveness. Many trials were made with various types of the machine, each trial revealing some defect which had to be studied and rectified. During this year, the latest improved machine has been put through several practical tests, and in August last a final trial took place on Mr. Gaul's farm at Bethania Junction. The ground, owing to the dry weather, was rather hard, and gave opportunity for a severe test of the work done. Two horses were employed and appeared to have no difficulty in drawing the machine, the pull of which amounted to between 8 and 9 cwt. The depth of the furrow was some inches below the crop. As the digger moved along, the tubers were caught up by a traveller and carried to the rear of the machine, whence they fell on the surface, none being buried or cut. The difficulty with the earlier types of the machine was the clogging of the movable parts with weeds and potato haulms. In the present machine, this fault was absent, all weeds being thrown on one side of the furrow, the potatoes lying in full view ready for picking up. During the whole trial the machine was perfectly free from any clogging.

It was estimated that one man and a pair of horses could get over about 4 acres per day. Mr. Gaul's crop amounted to about 5 tons per acre, which meant picking up 20 tons of tubers per day. In the days when the fork was—and, indeed, still is—the only implement used by the farmer for lifting his potato crop, a good day's work for a man was a ton a day, and if they were ploughed out with some form of double mould-board plough, half of the tubers were buried under the soil.

Farmers who witnessed the latest trials were of opinion that the machine was a pronounced success, and would come as a boon to all potato-growers, and Messrs. W. S. Binnie and Sons, Limited, engineers and boiler-makers, Brisbane, whose representative witnessed the trial, decided to at once manufacture a number of the machines to be ready in ample time for the forthcoming potato crop three or four months hence.

The machines will be sold, we understand, at a very reasonable price, at which price the inventor estimates that the farmer using it will be able to pay for the machine with three weeks' work as against the ordinary digging and other matters as at present.

The illustrations show a side and back view of the machine, which has been patented in all the States of the Commonwealth as well as in the United States and other oversea countries.

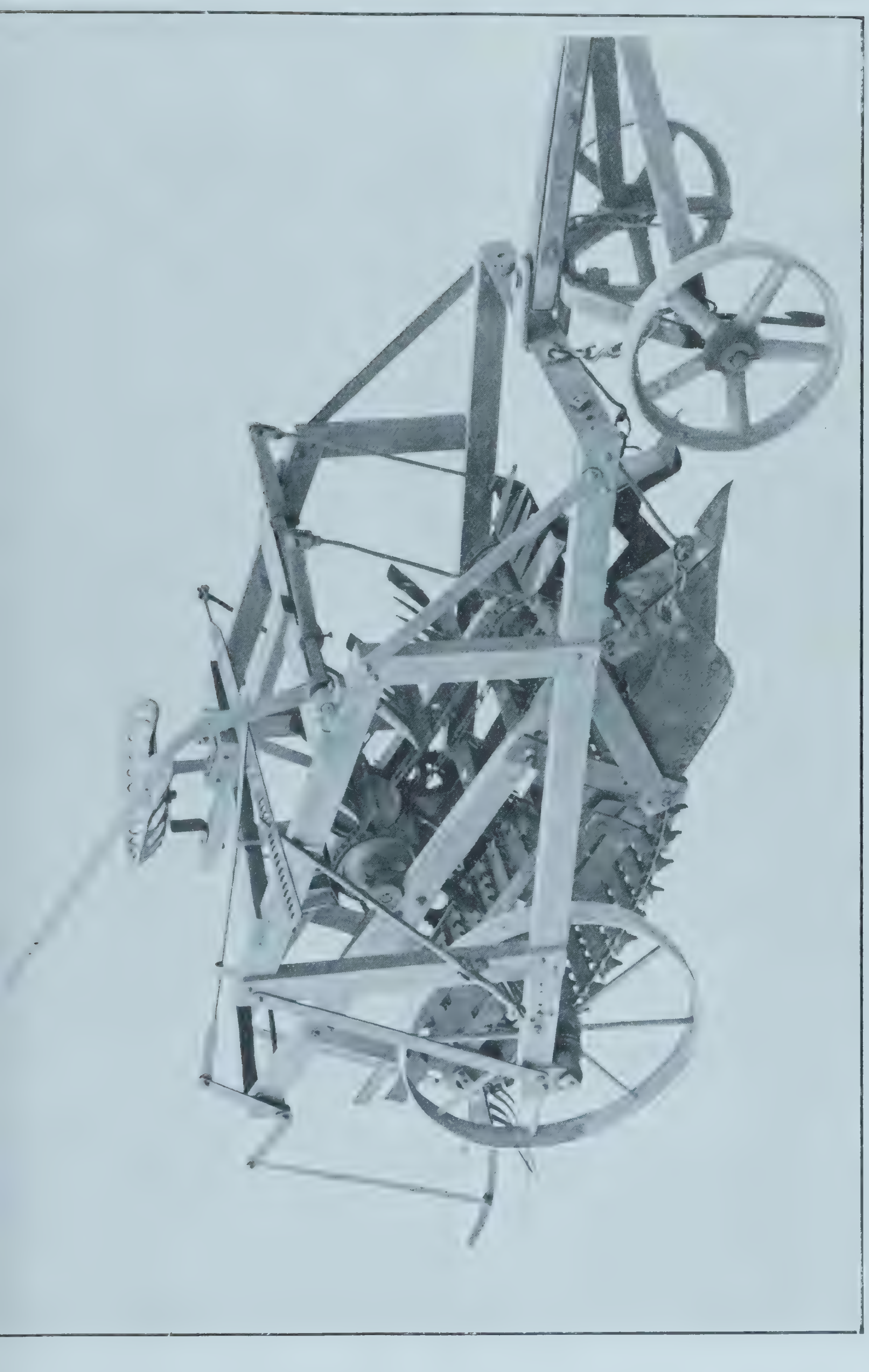

PLATE 24.—THE "ALICE DANIELS" POTATO DIGGING MACHINE (FRONT VIEW.)

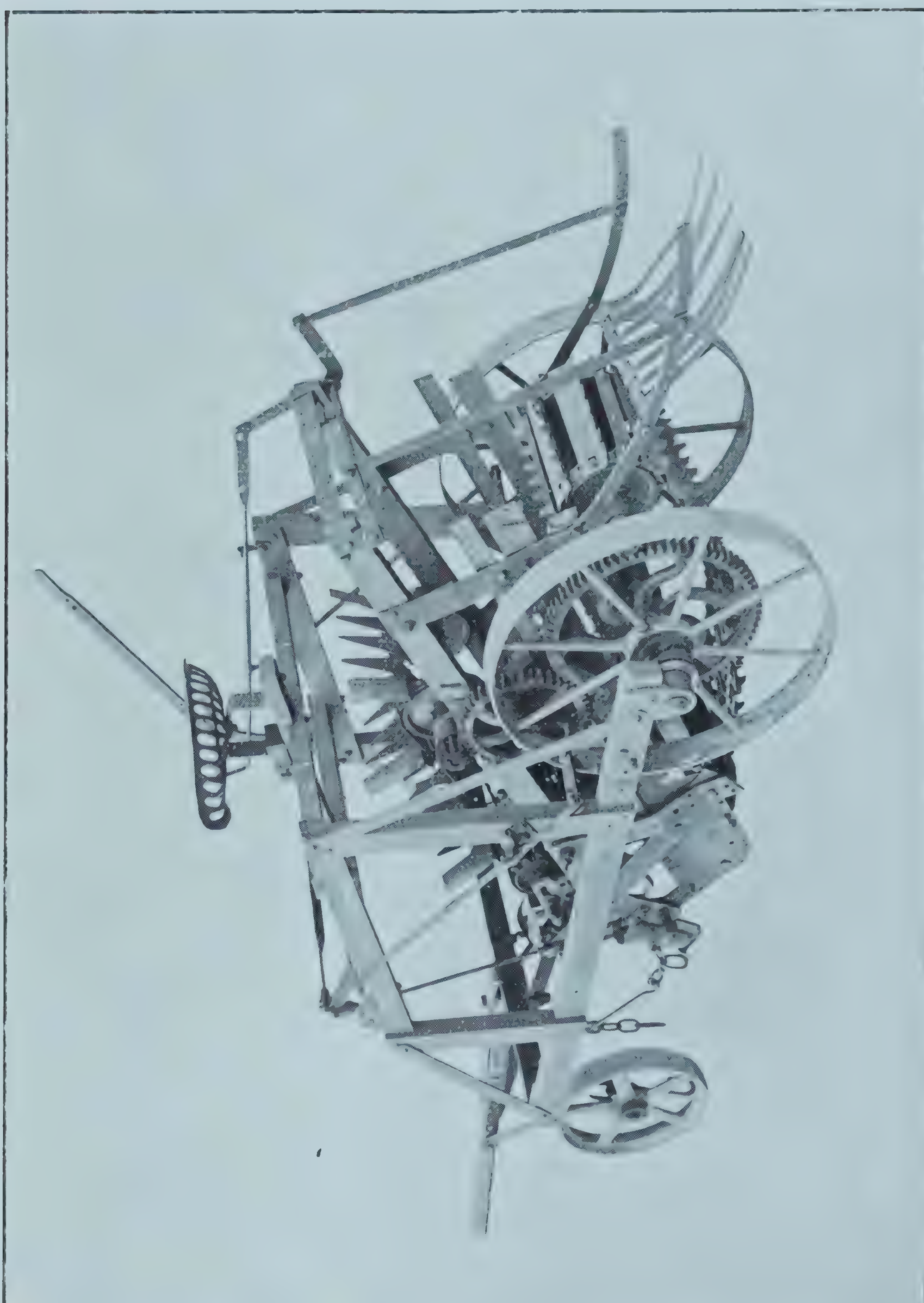

Plate 25.—The "Acme Digger" Potato Digging Machine (Back View).

General Notes.

THE NORTH COAST FRUITGROWERS' ASSOCIATION.

William Ellison, Secretary, Bald Knob, Landsborough.

Prior to the formation of the North Coast Fruitgrowers' Association, when each individual fruitgrower disposed of his produce in the Queensland and Southern markets, handicapped by many difficulties as to transport by rail and by sea, delays and consequent deterioration of fruit in transit occasioned serious loss to the growers. When, however, the latter became organised and the transport of fruit to the Southern States by special fruit trains was definitely arranged by the promoters of the above association, it was promptly recognised that the various district associations would greatly benefit by combining their forces with the object of securing the many benefits which it had been shown would accrue from such a combination. Mr. A. H. Benson, Director of Fruit Culture, has, at the request of Mr. William Ellison, Secretary of the North Coast Fruitgrowers' Association, who, in conjunction with his executive, has done sterling service in organising the growers and in perfecting, in conjunction with the Commissioner for Railways, the transport of our Queensland fruits by rail to the Southern States, forwarded to us a copy of a list of the associations that are united to form the present association, which clearly has demonstrated the advantages to be derived from co-operation, and points the way by which the man on the land may obtain the highest reward for his labour.

Affiliated Associations.

Beerburrum Co-operative Fruitgrowers' Association	R. H. Mason, Hon. Sec., Beerburrum.
Beerburrum Fruitgrowers' Progress Association	A. Keers, Hon. Sec., Elimbah.
Bli Bli Branch, Q.F.U.	E. J. Blanch, Hon. Sec., Bli Bli, *via* Nambour.
Bli Bli Fruitgrowers' Association ..	M. H. Wells, Hon. Sec., Bli Bli, *via* Nambour.
Brooloo Fruitgrowers' Association ..	F. Anderson, Hon. Sec., Brooloo, Mary Valley Line.
Buderim Mountain Fruitgrowers' Association	A. Blakey, Hon. Sec., Buderim Mountain.
Coolum Progress Association	Tage K. Scheibel, Hon. Sec., Coolum, *via* Yandina.
Cooloolabin Farmers and Fruitgrowers' Association	A. Drummond, Hon. Sec., Cooloolabin, *via* Yandina.
Cooroy Fruitgrowers' Association ..	J. N. Ross, Hon. Sec., Cooroy.
Currumbin Fruitgrowers' Association ..	D. McLaurin, Hon. Sec., Tomewin, Murwillumbah, N.S.W.
Elimbah Progress and Fruitgrowers' Association	C. Rutter, Hon. Sec., Elimbah, N. C. Line.
Eumundi Fruitgrowers' Association ..	H. E. Hicks, Hon. Sec., Eumundi, N. C. Line.
Eudlo Progress Association	D. Brownlie, Hon. Sec., Eudlo, N. C. Line.
Glasshouse Mountains Fruitgrowers' Association	G. Markwell, Hon. Sec., Glasshouse Mountains.
Golden Valley Fruitgrowers' Association	F. Stalow, Hon. Sec., Golden Valley, North Arm.
Goomboorian and Ross Creek Fruitgrowers' Association	J. P. Jackson, Hon. Sec., *pro tem.*, Goomboorian, *via* Gympie.
Howard and District Fruitgrowers' Association	T. Buffey, Hon. Sec., Glen Esk, Howard.
Landsborough Fruitgrowers' Association	William Ellison, Hon. Sec., Bald Knob, Landsborough.
Mapleton Progress Association	A. A. Probert, Hon. Sec., Mapleton, *via* Nambour.
Montville Fruitgrowers' Association ..	T. H. Brown, Hon. Sec., Montville, *via* Palmwoods.
Nambour Branch, Q.F.U.	J. N. Miller, President, Muir Hill, Nambour.

Affiliated Associations—*continued.*

Nambour Progress and Primary Producers' Association	J. N. Owen, Hon. Sec., Nambour.
North Arm Co-operative Fruitgrowers ..	L. H. Baldry, Sec., North Arm.
North Coast Farmers' League and Yandina Association	J. Steggall, Hon. Sec., Yandina.
P.M.B. Amalgamated Associations ..	F. D. Young, Sec., Palmwoods.
Palmwoods Fruitgrowers' Association ..	—. Brown, Hon. Sec., Palmwoods.
Perwillowen Branch, Q.F.U.	T. R. Miller, Hon. Sec., Perwillowen, Nambour.
Rosemount Progressive Association ..	E. Andreasen, Hon. Sec., Sylvania, Nambour.
Wamuran Progress and Fruitgrowers' Association	R. J. Whiting, Hon. Sec., Wamuran, Kilcoy Line.
Woodford Fruitgrowers' Association ..	H. C. Cowie, Hon. Sec., Woodford, Kilcoy Line.
Woombye and District Fruitgrowers' Association	E. E. McNall, Manager, Woombye.

Note.—Mr. Wilfred Reid has been appointed Hon. Secretary to the Cooroy Fruitgrowers' Association, *vice* Mr. J. N. Ross.

PRESENTATION TO MR. P. G. GILDER.

Mr. P. G. Gilder, who has been for six years editor of the ''Agricultural Gazette of New South Wales,'' was, last month, presented with a gold watch by Mr. W. C. Grahame, Minister for Agriculture, on behalf of the staff of the Department, on his relinquishing that position to join the literary staff of the ''Sydney Morning Herald.'' Mrs. Gilder was also presented with a pair of silver-plated jardinieres.

Answers to Correspondents.

DESTROYING STINGING TREES.

F. J. Martine, ''Glen Erne''—

It is very doubtful if the spraying of the stinging-trees with an arsenical solution would kill the shrubs right out. Most probably it would cause the leaves to wither rapidly, and thus facilitate the burning of the shrubs, so that they can be grubbed out more easily afterwards. Unless grubbed out they would sucker again.

Use an arsenical spray containing 1½ lb. of arsenic dissolved in the usual way with 3 lb. caustic soda or 4 lb. washing soda, made up to 15 or 20 gallons with water.

RECORD PRICES FOR WHEAT AND BARLEY.

''Farmer''—Toowoomba—

Yes. In June last, wheat and barley were sold at Willowburn grain shed, under instructions from the Minister for Agriculture, for seed purposes, by Messrs. Dalgety & Co. On 21st June a wire was received from Toowoomba to the following effect:—About 3,500 bags of wheat and barley, 2,000 bags being barley, were offered, and the sale was most successful, all previous records of prices for seed wheat being easily broken. The top price realised was 11s. 7d. per bushel for a line of graded Gluyas wheat, and practically all the sales were in the vicinity of 10s. to 11s., or over. Barley did not meet with such demand, malting barley, cleaned and graded, being sold at 6s. 4d. to 6s. 8d. Wheat (sold by sample), on rails at Brisbane: Gluyas, ungraded, from 8s. 5d. to 8s. 7d.; Budd's early, 9s. 3d. to 9s. 8d. Wheat, recleaned (on rails Brisbane), 8s. 3½d. to 8s. 7d.; uncleaned, 8s. 5d. to 8s. 7d.; on rails Bungeworgorai, Marshall's No. 3 graded, 8s. 1d. to 9s. 4½d.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST, 1919, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1919 AND 1918, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of Years' Records.	Aug., 1919.	Aug., 1918.
North Coast.	In.		In.	In.
Atherton	0·94	18	0·52	1·39
Cairns	1·90	37	0·61	2·34
Cardwell	1·31	47	0·56	2·05
Cooktown	1·45	43	0·81	1·99
Herberton	0·68	32	0·48	1·17
Ingham	1·47	27	0·31	3·22
Innisfail	5·57	38	2·55	7·38
Mossman	1·43	11	0·79	1·86
Townsville	0·47	48	0·03	1·27
Central Coast.				
Ayr	0·50	32	0·56	1·22
Bowen	0·70	48	0·23	1·05
Charters Towers ...	0·53	37	0·11	0·83
Mackay	1·05	48	0·38	0·89
Proserpine	1·19	16	0·88	2·27
St. Lawrence ...	0·90	48	0·21	0·53
South Coast.				
Biggenden	1·25	20	0·84	0·82
Bundaberg	1·44	36	0·48	1·22
Brisbane	2·21	68	0·69	1·24
Childers	1·30	24	1·17	1·35
Crohamhurst ...	2·43	25	0·82	3·81
Esk	1·69	32	0·79	2·27
Gayndah	1·28	48	0·94	1·90
Gympie	1·94	49	0·36	2·15
Glasshouse M'tains	1·83	11	0·99	2·06
Kilkivan	1·62	40	1·14	0·98
Maryborough ...	1·81	48	1·42	1·29
South Coast—continued:	In.		In.	In.
Nambour	2·13	23	0·85	4·27
Nanango	1·49	37	0·96	1·78
Rockhampton ...	1·02	32	0·45	0·45
Woodford	1·99	32	0·66	1·68
Darling Downs.				
Dalby	1·28	49	0·76	1·75
Emu Vale	1·28	23	0·67	1·85
Jimbour	1·36	31	0·59	2·16
Miles	1·28	34	0·61	1·02
Stanthorpe ...	1·94	46	0·73	2·53
Toowoomba ...	1·84	47	0·58	1·90
Warwick	1·57	32	0·98	2·32
Maranoa.				
Roma	0·99	45	0·53	1·31
State Farms, &c.				
Bungeworgorai ...	1·08	5	0.47	1·65
Gatton College ...	1·34	20	0·42	1·53
Gindie	0·82	19	0·81	0·15
Hermitage ...	1·55	13	0·87	1·95
Kairi	1·20	5	0·52	1·53
Sugar Experiment Station, Mackay	0·94	22	0·10	0·78
Warren	1·08	5	0·46	0·90

NOTE.—The averages have been compiled from official data during the periods indicated; but the total for August this year, and for the same period of 1918, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER, 1919.

Article.		SEPTEMBER. Prices.
Bacon	lb.	1s. 2d.
Barley	bush.	6s. 9d.
Bran	ton	£10
Broom Millet	,,	£25 to £45
Broom Millet (Sydney price)	,,	£90
Butter (First Grade)	cwt.	177s. 4d.
Chaff, Canary Straw	ton	£10 10s.
Chaff, Lucerne	,,	£13 15s. to £19 15s.
Chaff, Mixed	,,	£9 to £12 10s.
Chaff, Oaten	,,	£13 5s. to £13 10s.
Chaff, Wheaten	,,	£11 5s.
Cheese	lb.	11½d.
Flour	ton	£12 5s.
Hams	lb.	1s. 8½d.
Hay, Lucerne	ton	£17 to £18
Hay, Oaten	,,	...
Hay, Wheaten	,,	...
Honey	lb.	5½d. to 6d.
Maize	bush.	7s. 2d. to 8s. 1d.
Oats	,,	7s. 6d.
Onions	ton	£17
Peanuts	lb.	7d.
Pollard	ton	£10 10s.
Potatoes	,,	£20 10s. to £22 5s.
Potatoes (Sweet), per sugar-bag	...	8s. to 9s.
Pumpkins (Cattle)	ton	£4 10s.
Turnips (Swede)	,,	£6 15s.
Turnips, per dozen bunches	..	1s. to 1s. 3d.
Eggs	doz.	11d. to 1s. 2d.
Fowls	per pair	8s. to 8s. 7d.
Ducks, English	,,	4s. 9d. to 5s. 6d.
Ducks, Muscovy	,,	8s. 9d. to 10s.
Geese	,,	8s. to 10s.
Turkeys (Hens)	,,	15s. to 16s.
Turkeys (Gobblers)	,,	30s. to 33s.
Wheat (Milling)	bush.	7s. 9d.

VEGETABLES—TURBOT STREET MARKETS.

Beans, per sugar-bag	7s. to 17s. 6d.
Beetroot, per dozen bunches	1s. to 1s. 6d.
Cabbages, per dozen	3s. to 28s. 6d.
Carrots, per dozen bunches	9d. to 1s.
Cauliflowers, per dozen	9s. to 18s.
Cauliflowers (small), per dozen	4s. to 8s.
Lettuce, per dozen	6d. to 1s.
Marrows, per dozen	2s. to 5s.
Peas, per sugar-bag	6s. to 14s.
Potatoes (Sweet), per sugar-bag	5s. to 6s.
Pumpkins (table), per cwt.	5s. to 9s.
Tomatoes, per quarter-case	9s. to 15s.
Turnips, per doz. bunches	9d. to 1s. 3d.
Turnips (Swede), per sugar-bag	2s. 6d. to 3s.

SOUTHERN FRUIT MARKETS.

Article.	SEPTEMBER. Prices.
Bananas (Queensland), per case	25s. to 31s.
Bananas (Special), per dozen	...
Bananas (Tweed River), per case	25s. to 30s.
Lemons, per bushel-case	9s. to 12s.
Mandarins, per bushel-case	12s. to 22s. 5d.
Oranges (Local), per bushel-case	12s. to 20s.
Oranges (Navel) per bushel-case	14s. to 18s.
Passion Fruit, per double-case	16s. to 25s.
Pineapples (Queens), per double-case	17s. to 18s.
Pineapples (Ripleys), per double-case	16s. to 17s.
Pineapples (Common), per double-case	16s. to 17s.
Strawberries (Queensland), per tray	4s. to 7s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel-case	12s. to 17s. 6d.
Apples, Cooking, per bushel-case	10s. to 14s.
Bananas (Cavendish), per dozen	4d. to 1s. 0½d.
Bananas (Sugar), per dozen	4d. to 10d.
Cape Gooseberries, per box	8s. to 15s.
Citrons, per cwt.	7s. to 14s.
Cocoanuts, per sack	15s. to 25s.
Cumquats, per case	4s. to 7s. 6d.
Custard Apples, per quarter-case	6s. to 12s. 6d.
Lemons (Lisbon), per half-case	7s. to 10s.
Lemons (Rough), per cwt.	12s.
Mandarins, per case	15s. to 22s. 6d.
Oranges (Seville), per cwt.	16s. to 18s. 6d.
Oranges (Navel), per case	...
Oranges (Other), per case	14s. to 20s.
Papaw Apples, per quarter-case	2s. 6d. to 8s. 6d.
Passion Fruit, per half-bushel case	8s. to 15s.
Pears, per case	21s.
Pineapples (Rough), per dozen	4s. to 7s. 6d.
Pineapples (Smooth), per case	8s. to 13s.
Pineapples (Ripley), per dozen	4s. to 7s. 6d.
Rosellas, per sugar-bag	...
Strawberries, per dozen boxes	5s. to 20s.
Tomatoes (prime), per quarter-case	9s. to 11s.
Tomatoes (inferior), per quarter-case	4s. to 6s.

TOP PRICES, ENOGGERA YARDS, AUGUST, 1919.

Animal.	AUGUST. Prices.
Bullocks	£20 2s. 6d. to £23 10s.
Cows	£12 17s. 6d. to £16 2s. 6d.
Merino Wethers	43s. 3d.
Crossbred Wethers	50s.
Merino Ewes	30s.
Crossbred Ewes	38s. 9d.
Lambs	31s. 6d.
Pigs (Porkers)	44s.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	September.		October.		November.		December.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·30	5·47	4·59	6·4	4·46	6·27
2	6·2	5·34	5·29	5·48	4·59	6·5	4·46	6·28
3	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·29
4	6·0	5·35	5·27	5·49	4·57	6·7	4·46	6·30
5	5 59	5·35	5·26	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·25	5·50	4·55	6·8	4·46	6·32
7	5 57	5·36	5·24	5·50	4·55	6·9	4·46	6·32
8	5 56	5·37	5·23	5·51	4·54	6·9	4·46	6·33
9	5·55	5·37	5·22	5·51	4·53	6·10	4·47	6·33
10	5·54	5·38	5·21	5·52	4·53	6·11	4·47	6·34
11	5·53	5·38	5·19	5·52	4·52	6·11	4·47	6·35
12	5·51	5·38	5·18	5·53	4·52	6·12	4·47	6·36
13	5·50	5·38	5·17	5 53	4·52	6·13	4·47	6·36
14	5·49	5·39	5·16	5·54	4·51	6·14	4·48	6·37
15	5·48	5·39	5·15	5·54	4·51	6·14	4·48	6 37
16	5·47	5·40	5·14	5·55	4·51	6·15	4 48	6·38
17	5·46	5·40	5·13	5·55	4·50	6·15	4·49	6·38
18	5·45	5·41	5·12	5·56	4·50	6·16	4·49	6·39
19	5·44	5·41	5·11	5·56	4·49	6·17	4·49	6·39
20	5·43	5·42	5·10	5·57	4·49	6·18	4·50	6·40
21	5·41	5·42	5·9	5·57	4·48	6·19	4·50	6·40
22	5·40	5·43	5·8	5·58	4·48	6·20	4·51	6 41
23	5·39	5·43	5·7	5·58	4·47	6·21	4·51	6·41
24	5·38	5·44	5·6	5·59	4·47	6 22	4·52	6·42
25	5 37	5·44	5·5	5·59	4·47	6·23	4·52	6·42
26	5·35	5·45	5·4	6·0	4·47	6·24	4·53	6·43
27	5·34	5·45	5·3	6·1	4·46	6·25	4·53	6·43
28	5 33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·31	5·47	5 0	6·3	4·46	6·27	4·55	6·45
31	...	...	5·0	6·4	...	...	4·56	6·45

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania, unless "summer time" is adopted.

			H. M.
3 Sept.	☾	First Quarter	12 22 a.m.
10 ,,	○	Full Moon	1 54 p.m.
17 ,,	☽	Last Quarter	7 32 a.m.
24 ,,	●	New Moon	2 34 p.m.

The Moon will be in Perigee on 13th at 6·6 p.m., and in Apogee on the 29th at 3·30 p.m.

2 Oct.	☾	First Quarter	6 37 p.m.
9 ,,	○	Full Moon	11 39 p.m.
16 ,,	☽	Last Quarter	3 5 p.m.
24 ,,	●	New Moon	6 40 a.m.

The Moon will be in Perigee on 11th at 2·54 p.m., and in Apogee on the 27th at 6·42 a.m.

1 Nov.	☾	First Quarter	11 43 a.m.
8 ,,	○	Full Moon	8 35 a.m.
15 ,,	☽	Last Quarter	1 41 a.m.
23 ,,	●	New Moon	1 20 a.m.

The Moon will be in Perigee on 8th at 11·54 p.m., and in Apogee on the 23rd at 12·24 p.m.

1 Dec.	☾	First Quarter	2 47 a.m.
7 ,,	○	Full Moon	8 4 p.m.
14 ,,	☽	Last Quarter	4 2 p.m.
22 ,,	●	New Moon	8 55 p.m.
30 ,,	☾	First Quarter	3 25 p.m.

The Moon will be in Perigee on 7th at 12·48 p.m., and in Apogee on the 20th at 1·36 p.m.

The Moon will cause an annular eclipse of the Sun on Nov. 23rd, but it will not be visible in Australia. There will also be a partial eclipse of the Moon on Nov. 8th which will be visible in England but not in Australia.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets and the moonlight then extends all through the night, when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

Farm and Garden Notes for November.

FIELD.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, cotton, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c., and transplant for succession in calm, cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for November.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off-season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where the land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended

to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oidium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case, do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of the year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; for too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the spraying with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oidium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oidium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.

QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

THE COTTON INDUSTRY IN QUEENSLAND.

The following remarks on this industry by the Minister for Agriculture (the Hon. W. N. Gillies) will doubtless be read and appreciated by both existing and prospective cotton-planters. The figures given show clearly that this crop is one which can be safely engaged in with the almost certainty, given seasonable conditions, of a very profitable return. The quantities of cotton supplied to the Department for ginning and marketing on behalf of growers have regularly increased since the year 1914, and prices obtained by them have also risen from about 1½d. to 4d. per lb., and in all probability the suppliers this season will obtain 5d. or very little less for their cotton. Mr. Gillies said:—

"The history of the values received by farmers for cotton on the farm show a consistent upward tendency during the last few years; and it is evident that the crop, if profitable at values obtainable in May, 1914, is more so now. In 1914 the farmers received 1.65d. for cotton on the farm; in 1915 they obtained 2.54d.; in 1917 the sum of 3.58d. was paid; and last year 4d. a lb. The tenders in hand for the crop that is now being ginned indicate that the amount payable to farmers will be very close to 5d. per lb. for cotton on the farm; and upon 1,000 lb. of seed cotton to the acre, which should be realised upon a properly cultivated farm, the return, if 5d. is the amount to be paid, will be £21 6s. 8d. Should it be a fraction less than 5d., the difference will not be great. I strongly advocate the planting of this crop, particularly in view of the dry seasons we are now experiencing and the fact that Queensland should be able to supply the needs of Australia and, that accomplished, to export to Europe, as it does with butter and cheese.

"There is no doubt of the possibilities of cotton-growing here and of the quality produced. America is showing a tendency to keep her cotton at home, and the demand from Europe is immense. Therefore, there does not appear to be any fear whatever that the value to the farmer will fall below a profitable price, in comparison with other crops, for some years to come at least, if ever; and the Minister is so satisfied with the prospects that he is sure that the value to the farmer for the 1920 crop will not fall below that of 1918.

"The planting season is now beginning, and the Department of Agriculture will supply seed to anyone who wants it. Early application is, therefore, recommended, especially from residents on the Downs, who should plant in the early spring so as to get the crop off before the winter.

"In evidence of the excellent market for raw cotton existing in Australia, it may be pointed out that, in 1916-1917, at the middle of the war, there were imported into the Commonwealth 282 tons of raw cotton or 653,600 lb., mainly from China and Hongkong, all of which could have been produced in Queensland. This cotton was principally used in the manufacture of woollen goods for strengthening and consequently cheapening the latter. With the increase of the population of the States of the Commonwealth in the near future, the demand for cotton for these and other purposes in which cotton largely figures will naturally increase; and, with proper encouragement, there seems to be no reason why the manufacture of cotton goods should not be a prominent industry in Australia. At present there is much competition amongst merchants for the purchase of the annual Queensland cotton crop. Why, then, should we be under the necessity of exporting the raw material at considerable expense, only to receive it back in a manufactured state, when such manufactures could as easily be turned out locally as in the case of woollen goods?"

It is unfortunate that very dry weather conditions prevailed after the earliest cotton was sown last season, resulting in the failure of much of the seed to germinate. Had it done so, the plants could have thriven notwithstanding continued dry weather. There is, however, yet time to plant, even as late as November, and on the coast December; and the Department will supply seed gratis to farmers who wish to make a second planting.

Under ordinary circumstances as to rainfall and a proper preparation of suitable soil, the grower may reasonably expect to raise 1,000 lb. of seed cotton per acre; and during the season 1907 there are authenticated records of yields up to 2,000 lb. per acre, the price then ruling being 1½d. per lb., as against the present price of 4d. per lb. This surely should be encouragement to farmers to plant a few acres, particularly as the acclimated varieties of cotton are easier to pick than those formerly grown.

QUEENSLAND COTTON IN LIVERPOOL.

Mr. D. Jones has received the following letter from Messrs. Brown, Rakeford, and Co., cotton brokers, Liverpool, to whom he had sent some samples of Queensland cotton:—

"We have had the pleasure of visiting your Mr. A. E. Bidmead and discussing the Australian cotton with him. This cotton coming here in any quantity, and regularly, would command a very ready sale. The Brisbane cotton, we consider, is worth to-day about 23d. per lb. This is a clean bright cotton, and would be suitable for spinners who use American cotton. The Nikenbah (Maryborough) is far superior to the Brisbane as regards length, and we consider it worth from 25d. to 25½d. per lb. These prices are based on the American Futures, and July position to-day is worth 21.75d., so that the former would be worth about 175 on, and the latter about 350 on. As the Futures market advances and declines, so the value of this cotton advances or declines. We enclose a *pro formâ* account sale, giving charges that would be incurred if the cotton was sold in Liverpool ex warehouse.

"We have taken the bales to weigh 500 lb. per bale gross. When cotton is put into warehouse, the least rent that is charged is fourteen days. The charges in this account sale are based on the rates ruling to-day. We should be very pleased to handle any consignment that you may get of this cotton; and, as we have handled what is known as "outside growths" very freely for many years, we feel sure that we could sell this cotton for you easily, and at a satisfactory price.

"Outside growths are generally known as any grades except Indian, American, or Egyptian."

QUEENSLAND COTTON CROP OF 1919.

Since the Department of Agriculture installed a cotton-ginning plant on the premises in William street, and undertook to deal with all cotton grown in the State delivered at the gin-house, on the basis of an advance to growers and a participation in all profits from the sale of the lint, the price paid to them has risen from 1½d. per lb. to 3d., 4d., and during 1919 to 5d. per lb. There has been considerable competition amongst buyers not only in Queensland but in the Southern States for the whole of each season's crop, the price regularly increasing. Tenders for the current year's crop have been received, and the successful tenderers were Messrs. Henry Bull and Sons, of Sydney, at 1s. 6d. per lb.—a price which may be considered as very satisfactory. The same class of cotton, as will be seen from an article in this number of

the "Queensland Agricultural Journal," can easily be sold in Liverpool at from 23d. to 25½d. per lb., less freight, cartage, storage, commission, &c., &c.; so that the price now obtained locally is highly satisfactory. So the producer, if he harvests an average crop of 1,000 lb. of seed cotton per acre, obtains £20 16s. 8d. gross per acre. He delivers his crop at the Department's store, and at once receives an advance of 2d. per lb. When the raw cotton has been ginned, baled, and marketed —the cost of which amounts to about 1d. per lb.—the balance of profit is paid to the growers, which, for this season's crop, amounts to 5d. per lb., including the advance of 2d. per lb. already paid.

Owing to the dry conditions prevailing during the early part of the season, much of the seed failed to germinate, with the result that the crop fell short of that of previous years, and the total amount of cotton sold to Messrs. Bull and Sons was 11,500 lb.—in value, £862 10s.

What is now required is an old mill. In 10 lb. of seed cotton there are about 3 lb. of seed, every particle of which is valuable. The husks form a useful feed for stock; the "meal," or kernel, yields oil; and when the oil is extracted, there is the oil cake for stock. Thousands of tons of these useful by-products of the cotton plant have been in past times, and still are, unsaleable.

THE UNITED STATES COTTON CROP FOR 1918.

The "Weekly News Letter" (published by the Department of Agriculture, Washington) states that the 1918 cotton crop, including lint and seed, was worth 2,067,000,000 dollars (£413,400,000) to the producers. This is about three times the value of the cotton crop of 1914, and is twice the value of the crop of 1913, which had the highest value on record. This computation has just been made, at the close of the cotton year, by the United States Department of Agriculture, Bureau of Crop Estimates, based on average monthly prices received by growers and on monthly marketings. The number of bales of cotton marketed was 12,041,000. The area under cotton in the United States at present is estimated at 33,960,000 acres, or 91.3 per cent. of 1918. The yearly losses of cotton in the United States—due to deficient moisture, excessive moisture, and other climatic causes—amount to 88 lb. per acre. This probably means ginned cotton, which is equal to 264 lb. of seed cotton. Other causes of loss are:—Plant diseases, insect pest, especially the boll weevil, deficient seed, and other causes, accounting for 121 lb. of cotton.

Notwithstanding all their drawbacks, the cotton-growers continue to plant year after year, and from all accounts come out well on the right side of the ledger.

In Queensland the cotton plant has few enemies, and happily no weevil. Given reasonable rainfall at planting time, subsequent dry conditions will not much affect the crop. The cost of picking is about the same as in the United States, and the growers have the great advantage of a certain market at a minimum of cost through the co-operation of the Department of Agriculture.

CORN-GROWING COMPETITION, 1919-20.

1. This competition, as in previous years, was open to all under the age of eighteen years who are residents of the State of Queensland.

2. Applications to be enrolled in the competition closed on 20th October last.

3. The area to be devoted to the planting of the seed maize is one-tenth of an acre, selected seed for which, 1¼ lb. of Improved Yellow Dent, posted, free of cost.

4. Each competitor has absolute freedom in his choice of ground, and in the methods he may adopt in preparing, planting, and cultivating his plot; the plot not to exceed one-tenth of an acre. Yields will be calculated, when judging, on the basis of this area.

The following table shows the length the rows must be to give the exact area according as four, five, six or more rows are planted:—

No. of Rows Four Feet Apart.	Length of Rows in Feet.
4	272 ft. 3 in.
5	217 ft. 10 in.
6	181 ft. 6 in.
7	155 ft. 7 in.
8	136 ft. 1½ in.
12	90 ft. 9 in.
16	68 ft.

5. Each competitor will be required to keep a record chart showing the dates and particulars of the different stages of work, and these charts must be delivered, at the time of harvesting, to the officer appointed for superintending and verifying the yield, and this officer will post them on to Brisbane.

6. *Within seven days from the verification of the yield from the crop*, each competitor shall select, without aid from other persons, twelve uniform cobs of the maize from his crop, and forward them, with a letter of advice, to the Department of Agriculture and Stock, Brisbane. (*The cobs should be packed in straw envelopes, commonly used in packing beer bottles, and then placed tightly in a case which should be labelled and branded with the initials of the competitor and the number allotted to his district*).

7. Competitors must notify the Dairy Inspector for the district of the date when the crop shall have matured and be ready for inspection. *Unless this rule is observed, the competitor will be disqualified.* The maize *must* be thoroughly dry and ripe when harvested.

8. No competitor shall be allowed to employ or permit any labour upon the competition plot standing in his name, other than his own personal labour, excepting in relation to the driving of horses, for which, owing to circumstances, such help may be needed.

9. The competitor in failing to observe closely the rules of this competition becomes liable to disqualification.

10. The competition will close on the 30th June, 1920, and the prizes will be allotted thus:—

The competitors are grouped according to the following divisions:—

(1) The district supervised by—
Mr. E. W. Ladewig, Dairy Inspector, Beenleigh.
Mr. L. J. Kelly, Dairy Inspector, Harrisville.
Mr. A. K. Henderson, Dairy Inspector, Rosewood.

(2) The district supervised by—
Mr. C. C. Pickering, Dairy Inspector, care of Miss Macpherson, Victoria street, West End.
Mr. R. G. Ridgway, Dairy Inspector, Moray Bank, Moray street, New Farm, Brisbane.
Mr. L. J. Verney, Caboolture.
Mr. R. Winks, Dairy Inspector, Gympie.
Mr. J. A. Midgley, Dairy Inspector, Bundaberg.
Mr. W. S. Harding, Dairy Inspector, Esk.

(3) The district supervised by—
Mr. J. H. Barber, Dairy Inspector, Crow's Nest.
Mr. J. J. Carew, Dairy Inspector, Gatton.

(4) The district supervised by Dairy Inspector, Kingaroy.

(5) The district supervised by—
Mr. J. D. Ogilvie, Dairy Inspector, Clifton.
Mr. S. A. Clayton, Toowoomba.
Mr. J. R. D. Munro, Dairy Inspector, Warwick.

(6) The district supervised by Mr. D. Downs, Dairy Inspector, Gayndah.

(7) The district supervised by—
Mr. J. Cattanach, Dairy Inspector, Dalby.
Mr. R. S. Sigley, Dairy Inspector, Roma.
The Stock Inspector, Goondiwindi.

(8) The Central District of Queensland, including that supervised by Mr. L. Moriarty, Dairy Inspector, Rockhampton.

(9) The Northern district of Queensland, including that supervised by—
Mr. G. A. Smith, Stock and Dairy Inspector, Mackay.
Mr. J. P. Carey, Yungaburra.

11. Three special prizes of the value of £10, £5, and £3 will be awarded to the competitors who stand first, second, and third in the entire competition.

District Prizes.—First, £5; second, £2; third, £1.

If there are less than six competitors, prizes will be allotted as follows:—

Four to five competitors (inclusive), two prizes, first and second.

Two to three competitors (inclusive), one prize only, first.

When only one competitor, he or she, will be debarred from participating in the District Prize, but will be eligible to compete for the Special Prizes.

Note.—It is in the interest of the entrants to encourage others to compete for the valuable prizes being offered.

No money prizes will be given, but each successful competitor will be allowed to select some article to the value of his prize.

No prize will be awarded unless the yield of corn equals twenty bushels per acre. This stipulation may be waived under very exceptional circumstances in the case of a lower yield.

12. The aggregate points will be 100, and the judging will be based upon the following:—

(*a*) Quality of maize produced	15 points
(*b*) Yield of plot	75 points
(*c*) Notes and records of plot	10 points

13. The Director of Agriculture will be the sole judge of the competition, and his decision shall be final.

W. N. GILLIES, Secretary for Agriculture and Stock.

Brisbane, 24th September, 1919.

DESTROYING NUT GRASS.

Mr. F. Lan. Nott ("The Grange," Woongarra, Bundaberg), in reply to an inquiry by the Director of Experiment Stations, H.S.P.A., concerning a coccid insect attacking nut grass, wrote as follows:—

"When starting the cultivation of cane on my farm, I was greatly troubled with nut grass, which was distributed over about 30 acres, which thrived in ratio to the cultivation, and I experienced great difficulty in raising payable crops of cane. Usually, the crop had to stand over and thus become a two-years' crop. This, I may say, always happened in what is known as the plant crop, but ratoon crops were usually cut at twelve to thirteen months. Naturally, the loss through this delay, compared with crops on the same quality of land free from the weed, was very great; also, the amount of extra cultivation cost was severely felt.

"I had come to the conclusion that I would throw the land out of cultivation, but at last obtained some coccid insects on some nuts from a locality where I had heard that a trial (and a failure) had been made for the eradication of this pest by this means.

"I started with spreading 'diseased' nuts at about 8 yards apart over four-fifths of an acre, and allowed these to remain without disturbing them for two months, when the land carried a beautiful crop of nut grass. I then ploughed it up and harrowed it to better distribute the parasite (which had considerably increased in numbers), and planted the land with lucerne, and watched the progress of the disease.

"Naturally, when the lucerne grew vigorously, little nut grass was to be seen. However, from observation I was satisfied that the parasites were behaving well. After about fifteen months I removed the lucerne, and expected to see, at least, a considerable return of the nut-grass plants, but very few came, and those few were all weak and eventually disappeared.

"As control, I had the adjoining land on three sides of a rectangular plot, and on the eastern side was a road, which effectually prevented the parasite from extending in that direction, but they spread to the south side.

"Since that time I have had splendid results from the treatment, and am sure that, if carefully applied, the results are well worth the time spent on the trial.

"The following are the cardinal points to be observed:—

1. See that there is a good crop of nut grass.
2. Distribute the coccid as evenly as possible.
3. After distribution, plant a cover crop, or, at least, do not disturb the soil. This last remark is important, as by cultivation the coccid is killed before the nuts.

"Up to the present I have eradicated the pest on 20 out of the 30 acres, the time taken being four years from the commencement. The most difficult part is to stop the plant from spreading around the fringe or boundary of the land, as the coccid cannot travel from one patch across a wide gap to another.

"During the first two years I kept a sharp lookout, as the remedy might have taken to other and desirable plants, but so far I have not seen it live and generate on any other plant. I do not think there would be any danger by its introduction, nor should there be any trouble in introducing the coccids, as they can easily be transported on the nuts.

"I know of one place in Queensland and one in New South Wales where it was tried, and both of these would report failures—failures which, in my opinion, were caused by expecting the insect to work miracles and by a want of knowledge of the life history of the insects. My experiments were carried out on red volcanic soil of a heavy nature, with a climate usually dry in spring. From the beginning of operations to the killing out of the nuts should not take more than three years. When the insect has been distributed, allow the land to go into grass, or put in a cover crop, but do no after cultivation for the time mentioned."

CO-OPERATION FOR FARMERS.

Some time ago we pointed out to farmers, especially to those just settling on newly acquired land, the many benefits which some system of co-operation in the work of clearing the land, planting, harvesting, and marketing the crops, and various other matters incidental to the farming business? In the past and, to some extent, at the present day, neighbour helped neighbour, and the help was reciprocated to their mutual benefit. Where this was not the case, each individual producer made use of animal power far in excess of what is absolutely required to effect the object in view. The same theory holds good with respect to clearing, fencing, stumping, and many other works on the farm. We see strong men toiling single-handed at a work which, with the help of a couple of neighbours, could be done in a quarter of the time, and without any of the exhausting labour otherwise required. As an llustration which will commend itself to all scrub farmers, let us take the work of burning off. Sometimes a lucky burn will leave very little after-work to be done, but often a very bad burn happens, and every stick of timber almost has to be handled. A man working alone must do a tremendous lot of axe-work to enable him to pile up the timber in heaps. He has to cut the logs into lengths such as his strength is equal to carrying. He will thus make but a small impression by the end of the day on a five-acre patch of badly burnt scrub. Now, suppose that he has a dozen neighbours all employed at the same work, or even on a different class of work, such as stumping, pulling or husking corn, digging potatoes, or planting some crop. If these men would all combine to assist each other, it is clear that the work of burning off would be enormously lightened. A tree which the individual would have to cut up small, to enable him to deal with it, would be picked up bodily by six men and carried off with ease, all the axework being saved. It might be argued that, while these men are helping their neighbour, the work on their own farms is at a standstill. So it is—for a day or two, but now those who assisted the first man are in their turn assisted to plant, gather the crop, bale their hay, or to do any other work which may be pressing, and, so far from their having lost any time, their own work is far more expeditiously done by the assistance thus given. Again, take the case of a man having ten acres of lucerne cut and just ready to cart in. Everyone knows the disastrous effect of heavy rain on lucerne hay lying in the field. Rain is threatening, and the individual works himself and his horses from dawn to dark, and then finds that he cannot save his crop; but the neighbours come along with their teams, and the whole is safely got in before the storm. This is the commencement of co-operation, and it is easy to see how it works beneficially to all concerned. Now we go a little further, and come to marketing. In the neighbourhood of towns it is a common thing for a man to yoke up a horse, or perhaps two, to cart in three or four bags of corn, some potatoes, cabbages, eggs, &c. This takes the whole day probably, and he expends sufficient labour on the business to perform double the work. His neighbours do the same thing. Now, if we count up the hours so lost by each individual, reckon the labour which all those horses and men could have got through in the day, and add to this loss the probable expenditure of a few shillings on creature comforts in town, we shall find that the sum total will amount to more than the profit on the goods sold. If all those men were to combine and send their produce to town in a couple of big wagons, in charge of two or three of themselves, the work would be equally well

done, and at a minimum expenditure of cash and labour. Why should every housewife collect a few dozen eggs, a few pounds of butter, honey, and other minor farm products which are her own particular province, and at the week's end drive to town with a cargo weighing, perhaps, a hundredweight? Would it not be far more profitable for all if these things were handed over to one individual to take to market and dispose of? There would be no middlemen's profits, no commissions to come off the returns, and thus there would be an end of what is not unknown to many farmers—namely, an account sales, with expenses piled up to a greater figure than the sale money, and a respectful request to the sender to remit the balance. Here, then, is where co-operation comes in again.

Some think that a co-operative store would be the panacea for the disabilities under which farmers labour in the matter of disposing of their produce and purchasing supplies. But it should be remembered that a store, to be a financial success, must be managed by smart business men. Farmers may be shrewd and intelligent enough, but they have not been brought up as business men—that is, as shopkeepers, financiers, bookkeepers, and commercial travellers; and however carefully a set of directors might think they were managing the business, they must, in the long run, go to the wall. Auction sales are thought to be fair and aboveboard methods of doing business. But here again the farmer is "euchred." The auctioneer may be a straight, fair-dealing man, anxious to get the best price for the goods he is selling. It is the buyers, over whose bids he has no control, who combine to keep down prices. What is easier than for a lot of professional buyers, all known to each other, to combine to offer up to a certain figure and no higher? The majority of farmers are in a far different position to the woolgrower. If, at wool sales, prices do not suit the seller, he can afford to withdraw his lots and store them. He is not in any immediate hurry. The wool is an excellent asset. It will keep, and money can always be raised on it. The farmer's goods are perishable. If they are not sold, he cannot raise money on many of them. The farmer himself is probably in urgent want of money to carry out some work or get in some crop. The buyers know all this, and thus are able to get the produce at a figure which will leave them a handsome profit. It is little they care for the farmers. The best plan for the farmers of a district is to organise themselves into a society. But they will say they have done this all over the State. There are farmers' associations and butter and cheese factories and creameries, many of these co-operative, in the State. Leaving out the work of these factories, there are the associations and societies. What have these done for the farmers? With the exception of a few, they have done nothing more than collecting subscriptions and holding an annual show, which latter would appear to be the sole aim and end of most farmers' associations. Now, these societies could do a vast amount of valuable work for their members, provided that those members also do their share of the work. They should act as agents for the farmers; they should have their own reliable agent in every considerable town, to whom they would consign the produce of various kinds entrusted to their care by the farmers. They could arrange sales and prices in advance, by which action farmers would have no need either to hawk their produce or, if unable to sell, to leave it to rot in the barn or town store. Then, again, the society could act as buyers for their district. Goods bought wholesale are always cheaper than goods bought retail. Thus the farmers could send in orders for twenty tons of seed potatoes instead of paying through the nose for one ton. It would be the same with all farm necessaries, including sacks and implements of all kinds. There is no need to enumerate all the advantages this method of supply would bring in its train; they should be sufficiently obvious to all interested in buying in a cheap market and selling in a dear one.

There is, however, one thing which might be done by these societies, which, if well thought out and well carried out, would prove a blessing to many. We allude to the formation of a fund out of which farmers who require a small loan to tide them over a temporary difficulty could be assisted, and that with no loss of self-respect, for they could demand the loan as a right under certain conditions. There should be nothing of the land bank about this scheme. A little farther back we spoke of most men spending a shilling or two in town when bringing in their produce. Suppose that these shillings (which most can well afford or they would not spend them) were subscribed weekly to a fund operated upon by the president and committee of a farmers' association. In a district where 100 farmers are resident, if each were to subscribe, say, 1s. or 2s. weekly (the eggs would provide so much money and a good deal more, or they should do so, on a well-managed farm), these weekly deposits, to use a convenient term, would at 1s. per week produce £260, and at 2s. £520 in one year. For the first year after the formation of the fund, no borrowing should take place. The money would be placed out at interest for short periods, by which means the fund would be considerably increased. Now, when a farmer wanted a small sum, say from £5 to £25, he could borrow it for a short

term at low interest, and repay the principal and interest by easy instalments. The fund would thus take the form of a savings bank, in which the farmer receives interest on his money, and on which he can draw for an emergency on the most favourable terms, fair security being given for the repayment. Such a scheme appears to us feasible, but would naturally require careful elaboration, and could only be successful by the hearty co-operation of the farmers themselves. That the advantages of complete co-operation are not seen and seized upon by all our farmers is one of those things that "no feller can understand." See how easily it works out. A man goes into a shop to buy 1 lb. of tea. The price is 2s. Suppose he took a chest. Then the price is 1s. 8d. And so with all goods—the greater the quantity purchased the less has to be paid. What more need be said on this subject? The wise man can understand it, but how many of us are wise?

HOW A FLAX CROP PAYS.

The following particulars of a flax crop grown at Emerald, on the Fern Tree Gully line, 30 miles from Melbourne, which we take from the "Daily Mail," should be sufficient inducement to farmers owning suitable land and water in Southern and Western Queensland to make a trial of a few acres of linseed. It has long since been proved that the flax plant thrives well in this State, both on the coast and inland, producing seed and fibre, both of which products are in great demand in all countries.

The crop has yielded to the grower a gross result equal to £110 per acre. From 90 acres sown with flax, he cut 2,500 tons of green leaf, which yielded 300 tons of fibre. As the value of the fibre is £33 per ton, the gross return per acre was, as stated, £110.

[It would add to this interesting information an additional interest had the cost of production been given.—Ed. "Q.A.J."]

A MAIZE HARVESTER.

A notable invention (says the "Sydney Daily Telegraph") has recently been turned out by Mr. J. O. Smith, of Mount Russell, in the form of a maize harvester. The machine has been built to complete the operation of harvesting maize, to cut the stalk with the cob on it, and thresh the maize in one operation. It has a knife which operates on the principle of a binder, and will cut stalks as low as 6 in. from the ground. Fan beaters cause the stalk to fall on to a canvas elevator, and thence into the threshing drum. From there the stalk, grain, and cob core pass into the shaker box, and the maize sifted from the waste and dust, and passes into the elevator. It then travels into a box similar to the box on the side of a wheat harvester. The machine, which is of light draught, and can be operated by one man and three horses, is capable of treating 4 to 6 acres of maize per day. Mr. Smith is also the inventor of a maize dropper, the patent rights of which were bought by a machinery company. His latest machine should be of great service in harvesting maize under dry inland conditions.

A machine called a "Corn-shredder" was largely used in the United States of America nearly twenty years ago. When the stalks were well dried they were passed —stalks, cobs, husks, and all—through the machine, which delivered on one side the grains, shelled, sorted and winnowed, whilst on the other side it delivered the stalks, husks, and leaves in the form of a well-carded mass, which only required to be chaffed and mixed with some lucerne or cowpea chaff to form an excellent fodder for both cattle and horses.

TREATMENT OF COTTON SEED BEFORE SOWING.

In our last issue (October) we made mention of a method of treating cotton seed, before planting, to enable it to be sown by means of a seed drill. The fluffy fibre on the seed causes it to bunch together, and hence sowing has to be done by hand. The illustrations here given were not prepared in time to accompany the article explaining the process by which hand-sowing may be avoided. No. 1 shows the seed as it comes from the cotton gin or from the lintering machine. No. 2 depicts the seed treated with puddled clay, which enables it to easily pass through the drill.

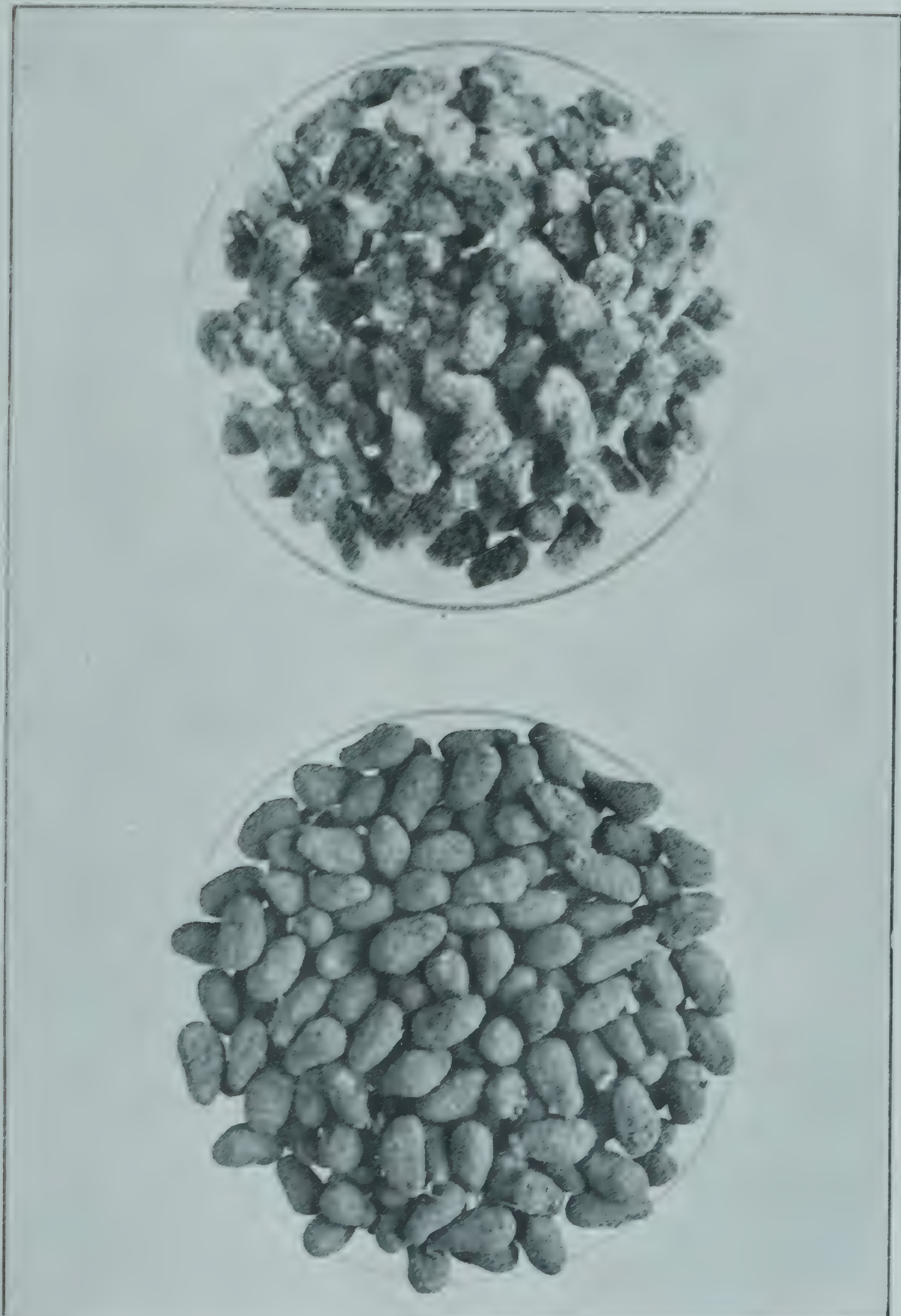


PLATE 26.

TOP—COTTON SEED AS IT LEAVES THE GIN.
BOTTOM—SEED PREPARED FOR THE SEED DRILL.

MARKET GARDENING.

HERB-GROWING.

In the July issue of the Journal, 1917, we pointed out, in an article on "Herb-growing," that there is a steady market in Queensland, and, indeed, in all the States of the Commonwealth, for culinary herbs, and that the climate of Southern Queensland, especially on the coast lands, is eminently adapted for their successful cultivation. This is fully borne out by the success attained by herb-growers, particularly at Cleveland, where large quantities are being grown. Previous to the war culinary herbs were mainly imported from Europe, especially from France. That source of supply being cut off, buyers of herbs on a wholesale scale are looking to the States of the Commonwealth to supply the deficiency.

When we wrote in 1917, we quoted prices as furnished by Messrs. Laughland, Mackay, and Co., Australasia, Limited, Brisbane, in reply to an inquiry from this Department on the subject, and, seeing the many inquiries we have had from returned soldiers and others as to the possibility of deriving a decent income from the herb industry, we cannot do better than reproduce in this issue what we wrote in July, 1917, which is as follows:—

Previous to the war, culinary herbs were mainly imported from Europe, especially from France. That source of supply being cut off, buyers of herbs on a wholesale scale in Australia are looking to the States of the Commonwealth to supply the deficiency. The climate of Southern Queensland, especially on the coastal ranges, is eminently adapted to the successful cultivation of herbs. In districts where cost of carriage precludes the possibility of ordinary heavy crops being profitably produced, the herb industry particularly recommends itself to farmers on account of the smallness in bulk of its products when compared value for value with other products—such as hay, chaff, maize, potatoes, &c.

Herbs are generally easy to grow from seed. If plants can be obtained, so much the better. They may be sown or planted out at any time between April and August. Where plants are not obtainable, the seed should be sown in rows drawn 1 foot apart, just deep enough to cover the seed. When the plants are up, they must be thinned out to 1 foot apart. During the summer, they must be well watered, the surface of the soil being kept loose and mulched. In autumn or early spring, to extend the area, take up and divide some roots, planting them 18 inches apart. New plantings should be made every winter, in order to supply the place of any that may have died out during the summer.

A MARKET FOR HERBS.

The most useful herbs, and in greatest demand commercially, are:—Marjoram, Sage, and Thyme; and with reference to the wholesale prices for these, the Department of Agriculture and Stock has received from Messrs. Laughland, Mackay, and Co., Australasia, Limited, 235 Edward street, Brisbane, a letter in reply to an inquiry from the Department on the subject.

The above firm are desirous of purchasing the herbs named in considerable quantities, provided a decent sample can be offered, the buyers paying cash on delivery. At present supplies of such herbs cannot be obtained from Europe; hence an undoubtedly good opportunity is afforded to farmers and others in Southern Queensland to produce Australia's requirements in this line.

The firm quote prices which they paid in the past for rubbed, dried herbs, such as Marjoram, Thyme, and Sage, as follows:—

Marjoram, 50s. 9d. per cwt.; Thyme, 23s. 6d. per cwt.; Sage, 29s. 6d. per cwt. These prices are c.i.f. Australian ports. To them would have to be added local landing charges—about 10s. per ton of 40 cubic feet, and duty at the rate of 4d. per lb.—bringing the actual price of the imported article to 88s. per cwt. for Marjoram, 60s. 9d. for Thyme, and 66s. 9d. for Sage. The main difficulty would be the picking; but this could easily be done by female labour, as it is fairly light work.

THE CULTIVATION OF CULINARY HERBS.

SAGE.—Sage grows well in parts of Queensland, but does not like much heat. On the high coastal lands—as at Toowoomba, Warwick, Stanthorpe in the South-west, and Herberton in the North—it thrives well. It is easily propagated by

cuttings, and, if planted about 15 to 18 inches apart each way, will soon cover the ground and keep down weeds. The dried leaves find a ready sale. According to the labour available, the plants may be hand-stripped, or cuttings may be made two or three times a year.

THYME.—Unlike the Sage plant, Thyme is able to stand a good deal of heat. It requires the same treatment in planting as Sage. Along with other culinary herbs, it is largely imported in a dry state for flavouring purposes, being very largely used in the butchering trade.

MARJORAM.—Plants may be raised from cuttings planted, say, in April if the weather be mild; but a better plan is to divide old plants into as many single-stemmed plants with a root or two as possible. These should be planted in well-worked ground at distances of 18 to 20 inches apart each way. A couple of chippings with the hand cultivator will be all that is necessary to keep down weeds, as the plants soon cover the ground. Two or three cuttings may be made every year. There is a very considerable demand for the dried leaves. As in the case of Thyme and Sage, Marjoram requires a deep, friable loamy soil and a temperate climate, under which conditions it will grow to a height of 18 inches.

The leaves of herbs must not be dried in the sun or near a fire.

HERB-GROWING FOR WOMEN.

"Before the war Australia imported annually £10,000 worth of culinary herbs." What a staggering piece of information is this, given us in a bright and practical article, by Miss Annie S. Evans, in a Melbourne newspaper recently. With all our natural advantages and opportunities for growing herbs, to think that we have been importing them at this rate. We have no excuse but ignorance and indolence. Some of us are ignorant, some are indolent, some are both.

When the continental market was closed and the shortage began to assume serious proportions, and the demand became greater than the supply, we knew for the first time where we obtained our herbs. Not only Germany, but France, Italy, and the Balkans supplied us.

One man—"out Ballarat way"—Mr. George Morgan, evidently is one of the few who has not suffered from the prevailing indolence, because for the last thirty years he has been a herb farmer. He has 16 acres under cultivation, which, we believe, is the largest farm of the kind in Australia. This year one firm alone is prepared to take his whole harvest. So here is an opportunity for the woman on the land!

This successful grower informed his interviewer that women could easily make a livelihood with herb-growing. But they must begin in a small way if they want to be successful growers. He suggests 100 cuttings as enough to start with, which can be added to every year. The first year's crop will be probably small, but the crop will increase every year. June or July are the months for planting in Victoria, and the best aspect is an eastern one. A clay or sandy soils the herbs flourish in, but a moist soil is also good. The land should be twice ploughed, then harrowed, the cuttings then put in fairly far apart, and set in a square formation.

The crop is cut when in flower, which is about November, and the cutting should be done with a hand sickle used close to the ground. Every leaf is used, even the siftings; there is no waste whatever. A hoe, a sickle, flail, and a few baskets are the only necessary requirements.

In taking slips they should always be cut, never broken.

Marjoram, Thyme, and Sage are particularly referred to here, for which there is always a large demand by merchants and butchers. Sage is the most expensive, and as the new leaf is best a fresh supply should be sent out every season.

A very comforting assurance is given that no animal, mice, or rabbits will touch the herbs, nor does any pest molest them. Sheep will carefully graze among the herbs without touching them.

We hope that some of our women readers will be diligent enough to give herb-growing a trial, and shall be glad to hear of their success.—"Weigel's Journal."

JOURNAL OF TROPICAL AGRICULTURE, PARIS.

We have been asked to announce the resumption of publication of the above Journal, which was suspended in August, 1914, owing to war conditions in France. The present address of the publication is 27 Rue Lafitte, Paris. The Journal in the past dealt with many industrial matters of interest to Australians, especially in the tropics.

Pastoral.

WHAT IS A HOGGET?

In a case which came before a New South Wales District Court recently the case hinged upon the definition of the word ''hogget.'' The report closed with:—''After hearing a number of expert sheepmen on both sides as to the definition of a hogget, his honour came to the conclusion that a hogget was merely a young sheep which might vary in age from six months to two years, according to the definition each man carried in his mind. It was evident, he said, that there was no universal definition of the term.''

A well-known authority in New South Wales (Mr. E. D. E. van Weenen) has addressed a letter on this subject to the ''Sydney Morning Herald.'' He remarks that it was evident that Judge Bevan had such faith in the expert evidence that he decided to accept all of it as regards the ages of a sheep during which it is entitled to the word ''hogget.'' Putting aside the English definition of a ''hog'' or ''hoggerel,'' as being a sheep a year old, also the question of teeth, Mr. van Weenen submits that custom in Australia has given the definition of the word ''hogget'' as a sheep from twelve to twenty months old at date of shearing. A young sheep after six months and up to twelve months old is called a weaner.

Another correspondent (''R.S.A.'') writes:—''Referring to the dispute as to what constitutes a hogget, it may interest sheepmen to know that in New Zealand, where the writer has had many years' experience among longwool sheep, the standard for hogget is arbitrary. A lamb takes the name of hogget when it is weaned, and is known as such till the arrival of its first two permanent teeth. It is then called a two-tooth wether or a maiden two-tooth ewe. Does it not stand to reason that there must be some fixed standard? Otherwise transactions are always open to repudiation. Also a ' comeback ' is classed as a crossbred. A buyer can always use his right to reject sheep he does not like.''—''Leader.''

In one of the earliest numbers of the ''Queensland Agricultural Journal'' it is recorded that the question ''What is a hogget?'' was answered by two graziers travelling in a railway carriage, one of whom remarked that he expected to get a good figure for his hoggets. When he left the train, one of the remaining occupants asked his neighbour, ''What's a hogget?'' ''Well, I don't exactly know,'' was the reply; ''but I think it has something to do with a pony when its mane is cropped.'' ''Not at all,'' said the other; ''a hogget is a young pig.'' A new passenger comes in, and it is resolved to leave it to him. ''A hogget?'' he sagely replied; ''well, you'll have to excuse me, gentlemen, because I don't know anything about poultry.''—Ed. ''Q.A.J.'']

SHEEP ON THE COAST.

In September last a demonstration of sheep-shearing, lamb-marking, drenching, and selection was given by Mr. W. G. Brown, Instructor in Sheep and Wool, of the Agricultural Department, assisted by Mr. Wilson, on Mr. Massam's farm at Beaudesert. Mr. Brown has long advocated the keeping of small flocks of sheep on the coastal lands, provided the proper conditions of feeding and general treatment are observed, and this demonstration was intended to show that sheep were a very profitable source of revenue to farmers on the coast. The practical demonstrations were preceded by a short address, in which Mr. Brown stated that Border Leicesters and crossbreds were the most suitable sheep for these districts. Mr. Massam's flock of 200 were of this breed and were looking remarkably well, considering the long spell of dry weather. The lambing (53 lambs from 58 ewes) showed a percentage of 91. The sheep had a full growth of wool, the fleeces, after ten months' growth, generally weighing 9 lb. Mr. Brown dwelt on the importance of checking the stomach worm by proper drenching, and said that all new sheep should be drenched before placing them on coastal farms.

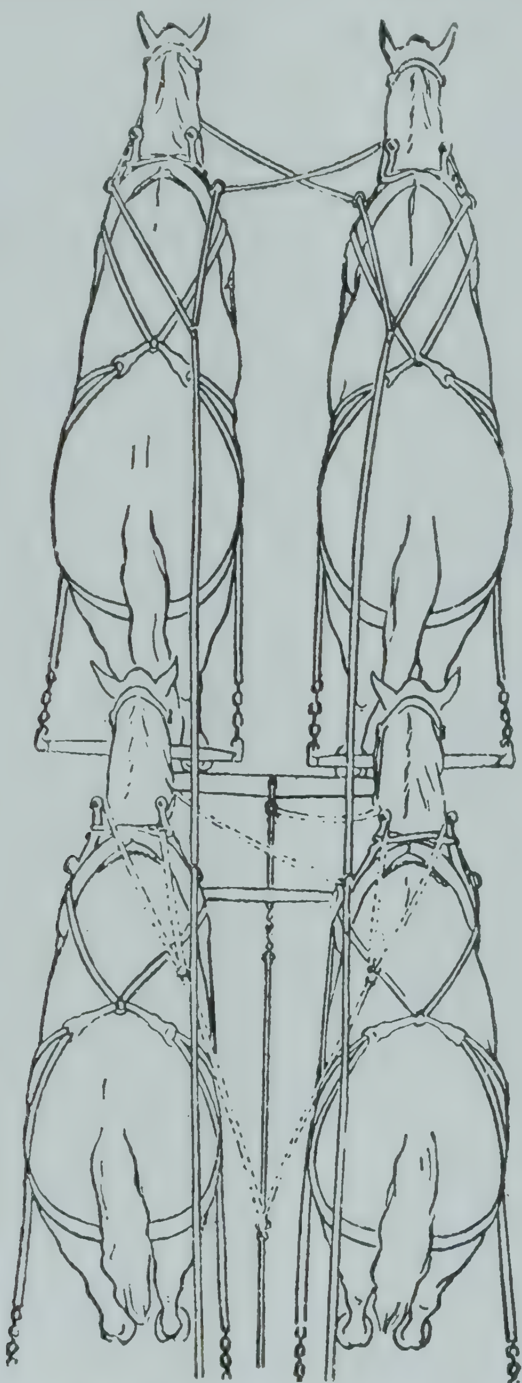
RECORD PRICE FOR QUEENSLAND WOOL.

A feature of the wool sales in London on 24th September last was the record price of 100½d. per lb. obtained for twenty-one bales marked ''Garomma'' and twenty-one bales marked ''Rosevale.'' Both consignments were superior combing scoured from Queensland.

The Horse.

A TANDEM HITCH FOR TEAMS.

In a recent issue of ''The Percheron Review'' (U.S.A.) is given detailed information regarding the use of the pulley equaliser to drive two or more teams tandem. In order to do this the method of ''tying-in and bucking-back'' illustrated in the accompanying sketch must be used. The lead team is the only one on which lines are used. The furrow horse from each of the remaining teams is ''tied-in'' to the



draw rod with an ordinary lead strap and his mate tied to his hame ring. ''Bucking-back'' is accomplished by fastening each end of a strap 10 feet long to the bit rings and extending it back over the top of the collar between the hames. A ring rides free on this strap, to which a single strap is fastened. The other end of this strap is attached to a ring on the draw rod. The hitch is so designed that when any team pulls forward the draw rod is pulled back, which tightens the buck strap and thus holds the team from going ahead.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1919.

In spite of the hot weather prevailing during the month, the laying has been good. Broodies have been somewhat plentiful, four of them being White Leghorns. The heavy breed group pens have been the most troublesome in this respect. G. Turner lost a bird, and has replaced it. The most notable laying for the month was by Fanning's pen of White Leghorns and E. F. Dennis's Black Orpingtons. The former finished up the month by laying 41 eggs in the last 7 days, and in the 30 days produced 20 possibles of 6 eggs. The Black Orpingtons laid 39 for the last 7 days, and scored 160 for the month. Several good sequences have been made. R. Holmes (E. bird) had a run of 67 without missing. E. M. Larsen's C made a run of 64, breaking on the 26th. R. Burns's D broke a run of 39 on the 2nd September and then finished the month without a break. The longest run in White Leghorns is by Manson's A bird, which has laid for the last 23 days.

At the request of competitors we publish the scheme we have adopted for judging birds for the "true-to-type" prizes. It is necessary to give a brief explanation of the principles which have guided us in elaborating the scheme for judgment:—

1. The main thing to be remembered is that birds are entered into the competition for test as to fecundity, with the ultimate object of using them as breeders. Hence all their characteristics have to be considered in the light of their possible transmission to the progeny.

2. To be true to type, the birds must not possess any but breed characteristics. For example, side spikes in single combs, or feathered legs in clean-legged varieties, &c., would be disqualifications. At the same time, any exaggeration of features, such as too large a comb in White Leghorns, would count against the bird just as much as a comb that was too small and erect. In the same way, medium values are required in many of the features, for it is fully recognised that the birds are for utility not show purposes.

3. Because the birds are to be used for breeding, stamina is considered of vital importance; hence it has been deemed necessary to score the birds for stamina independently of type and conformation. In judging for stamina, the general habits of the birds during four to six months' observation are utilised.

4. Each bird is judged separately, and the group of six birds finally classified as the aggregate of the six individuals. In this way a measure of the uniformity of the breeding is given.

5. For the type of the various breeds the standards of the Poultry Club of England have been taken as a basis, with the following modifications:—Exaggeration of points is not allowed: the general conformation of the body has to comply with that essential wedge shape which is characteristic of a good layer.

The scale of points adopted is as follows:—

No. 1. Type and Conformation—

Head—	Points	
Comb	10	
Skull	5	
Ear lobes	5	
Face	5	
		25
Body		30
Size		25
Legs		10
Colour of plumage		10
Total		100

No. 2 Stamina—

Eye	15
Head	20
Legs	15
Heart and lung room	15
Digestive capacity	15
Observation general health and habits	20
Total	100

Disqualifications:—Showing alien blood. Inheritable characters, such as side spikes, feathering on shanks of clean-legged varieties, &c. Bodily deformities, including wry tail, squirrel tail, crooked toes, &c. Any competitor found guilty of faking will be disqualified and debarred from entering future competition.

Birds gaining 75 or more points in each of the above standards will be placed in the 1st Class. Any bird failing to obtain 50 per cent. of the points allocated for any one feature will be passed out. In classifying the pens, the following rule is adopted:—If all birds are Class 1, the pen is Class 1. If 1 of the 6 birds does not pass, the pen is Class 2. If 2 of the birds fail to pass, the pen is Class 3. If more than 2 fail to pass, the pen is Class 4. The classification is shown in the table of results. This year pens classed 1 and 2 will be eligible for the "true-to-type" prizes; but next year Class 1 only will be eligible.

The following are the individual records:—

Competitors.	Breed.	Class.	Sept.	Total.
	LIGHT BREEDS.			
*J. M. Manson	White Leghorns ...	2	154	797
*W. Hindes	Do.	1	145	773
*T. Fanning	Do.	1	163	771
*Dixie Egg Plant	Do.	2	148	749
*E. A. Smith	Do.	2	151	724
*Dr. E. C. Jennings	Do.	3	142	700
*G. W. Hindes	Do.	1	139	691
*Haden Poultry Farm	Do.	2	138	6[illegible]9
*Range Poultry Farm	Do.	1	141	672
*Quinn's Post Poultry Farm ...	Do.	1	149	659
S. McPherson	Do.	1	124	655
*B. Caswell	Do.	2	147	639
J. H. Jones (Toowoomba) ...	Do.	1	135	639
*C. P. Buchanan	Do.	4	133	636
G. Williams	Do.	1	125	629
*W. Becker	Do.	2	141	628
*H. Fraser	Do.	2	133	628
G. J. Byrnes	Do.	3	118	620
*L. G. Innes	Do.	3	144	609
*Mrs. L. F. Anderson	Do.	1	144	600

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Class.	Sept.	Total.
	LIGHT BREEDS—*continued.*			
W. A. Wilson	White Leghorns ...	2	129	599
H. A. Jones (Orallo)	Do.	3	132	599
*J. J. Davies	Do.	1	141	595
S. W. Rooney	Do.	1	121	591
*W. Lyell	Do.	3	136	590
*Thos. Taylor	Do.	2	149	566
*Mrs. A. G. Kurth	Do.	2	141	565
*Mrs. R. Hunter	Do.	2	124	552
G. H. Kettle	Do.	2	123	538
Geo. Trapp	Do.	2	129	537
B. Chester	Do.	2	129	519
H. O. Jones (Blackstone) ...	Do.	1	124	514
Oakleigh Poultry Farm	Do.	3	123	512
Mrs. N. Charteris...	Do.	3	129	511
C. A. Goos	Do.	2	124	505
*O. W. J. Whitman	Do.	1	129	494
N. A. Singer	Do.	1	148	492
R. C. J. Turner	Do.	2	114	476
J. W. Newton	Do.	1	133	469
W. Morrissey	Do.	3	116	451
J. H. Dunbar	Anconas	2	106	443
	HEAVY BREEDS.			
*R. Holmes	Black Orpingtons ...	2	147	858
*E. F. Dennis	Do.	1	160	779
*E. M. Larsen	Do.	1	151	777
*R. Burns	Do.	2	147	774
Geo. Nutt	Do.	1	135	749
*W. Smith	Do.	1	149	735
*A. E. Walters	Do.	2	131	729
*A. Shanks	Do.	2	141	719
*Kelvin Poultry Farm	Plymouth Rocks ...	1	130	706
*E. Morris	Black Orpingtons ...	3	125	684
*Nobby Poultry Farm	Do.	2	143	683
*D. Fulton	Do.	3	110	642
*Jas. Ferguson	Chinese Langshans ...	3	119	622
*T. Hindley	Black Orpingtons ...	2	137	621
*W. H. Reilly	Chinese Langshans ..	3	129	604
*H. Puff	Rhode Island Reds ...	1	112	590
*Mars Poultry Farm	Black Orpingtons ...	2	144	577
Burleigh Pens	Do.	1	124	569
A. Homan	Do.	2	123	544
*F. W. Leney	Do.	3	144	540
R. B. Sparrow	Do.	2	144	523
*T. B. Barber	Do.	2	119	519
C. H. Singer	Do.	2	128	480
J. A. Cornwell	Do.	1	123	468
A. Gaydon	Do.	2	126	443
H. Ashworth	Do.	1	131	441
Total	...	...	8,986	41,002

* In the foregoing indicates that the pen is being single tested.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	135	127	138	135	130	132	797
W. Hindes	145	133	126	116	127	126	773
T. Fanning	140	111	129	135	124	132	771
Dixie Egg Plant	117	119	135	142	114	122	749
E. A. Smith	116	114	137	119	109	129	724
Dr. E. C. Jennings	121	94	121	115	113	136	700
G. W. Hindes	127	104	129	113	103	115	691
Haden Poultry Farm	127	128	122	112	93	107	689
Range Poultry Farm	90	115	130	130	94	113	672
Quinn's Post Poultry Farm	103	117	127	122	97	93	659
B. Caswell	90	52	109	135	141	112	639
C. P. Buchanan	90	125	98	98	107	118	636
H. Fraser	82	115	126	108	83	114	628
W. Becker	136	113	126	91	59	103	628
L. G. Innes	77	121	83	113	115	100	609
Mrs. L. Anderson	107	119	84	91	88	111	600
J. J. Davies	86	88	107	110	109	95	595
W. Lyell	88	113	115	90	92	92	590
Thos. Taylor	114	75	73	115	114	75	566
Mrs. A. G. Kurth	122	99	105	91	59	89	565
Mrs. R. Hunter	87	92	101	97	90	85	552
O. W. J. Whitman	74	108	76	72	86	78	494
HEAVY BREEDS.							
R. Holmes	146	148	159	130	163	112	858
E. F. Dennis	148	110	141	127	105	148	779
E. M. Larsen	135	144	131	119	137	111	777
R. Burns	131	120	130	162	114	117	774
W. Smith	93	141	120	108	148	125	735
A. E. Walters	125	119	133	117	104	131	729
A. Shanks	80	91	146	127	129	146	719
Kelvin Poultry Farm	151	102	107	100	132	114	706
E. Morris	117	116	121	112	140	78	684
Nobby Poultry Farm	103	107	100	117	131	125	683
D. Fulton	108	109	113	99	115	98	642
Jas. Ferguson	117	136	85	85	101	98	622
T. Hindley	131	119	72	112	93	94	621
W. H. Reilly	92	82	118	118	94	100	604
H. Puff	115	76	98	119	91	91	590
Mars Poultry Farm	76	127	180	62	66	116	577
F. W. Leney	75	87	107	132	65	74	540
T. B. Barber	83	88	85	86	102	75	519

CUTHBERT POTTS,
Principal.

GENERAL COMMENTS ON "TRUENESS-TO-TYPE" COMPETITION BIRDS.

DETAILS OF CLASSIFICATION.

	Class.	
Mrs. L. Anderson	1	Even throughout; A possesses ideal headpiece.
Haden Poultry Farm	2	D and E could do with a little more size. Taken throughout, a tight-feathered, hardy, business-like pen.
H. Fraser	2	Good size; C and D, high tail carriage; A possesses ideal body.
Dr. Jennings	3	Too high in carriage; can do with more size; an improvement on last pen; excellent doers; tight-feathered.

DETAILS OF CLASSIFICATION—*continued.*

	Class.	
Range Poultry Farm	1	Very even throughout; good heads.
Thos. Tayler	2	Very uniform in size; can do with more comb; splendid eyes.
B. Caswell	2	Magnificent face and eyes; tail carriage inclined to be high.
Dixie Egg Plant	2	A big improvement in size on previous pen; B has outstanding superiority in type.
J. M. Manson	2	Very even in size and shape; F has slight side spike on comb; excellent doers; splendid in eye and face.
L. G. Innes	3	Lack uniformity in size and shape.
T. Fanning	1	A fine pen throughout; A could do with a little more size; headpieces all that could be desired.
J. J. Davies	1	A pen we like very much in every way.
W. Becker	2	A big improvement on previous pen; tail carriage can still be lowered a little.
Quinn's Post Poultry Farm	1	Very even in type and size.
O. W. J. Whitmen	1	Approaching English standard.
G. W. Hindes	1	A, B, C, and D of exceptional merit; E and F just a trifle small.
Mrs. R. Hunter	2	Headpieces a little coarse; D a very good specimen.
W. Hindes	1	A, B, C, and D stand right out; E and F on the small side.
W. Lyell	3	Defective combs; F best body formation.
Mrs. A. G. Kurtl.	2	E, tail carriage too high; good size throughout; we like F very much for type.
E. A. Smith	2	C spoils pen, being very much on the small side; otherwise first class.
C. P. Buchanan	4	A has side spikes; C too small; D deformed.
H. Puff	1	Good size and type; E and F of exceptional quality.
R. Holmes	2	Fair-sized and uniform; C and D inferior combs.
E. Morris	3	B has side spikes; C could do with more size; D closely approaching ideal.
E. M. Larsen	1	Lower on leg than majority; good heads; a little more size wanted.
F. W. Leney	3	On racy side, with the exception of A, which approaches our requirements.
J. Reilly	3	Too variable; side spikes in evidence.
W. Smith	1	Good heads; have size and are not so long in back as majority; D is our choice.
T. Hindley	2	Fail in colour; B shows white in lobe; good eyes; can do with more moderation in comb.
R. Burns	2	Side spikes on E; a big improvement in type on previous pens.
D. Fulton	3	Fail in type and side.
Nobby Poultry Farm	2	Side spikes on F's comb a bit overdone; splendid eyes; first-class colour and size; an improvement.
Mars Poultry Farm	2	Side spikes on D, and F being pale in eye spoil pen from being the most typical in the competition; possess size, shape, and are very low.
A. Shanks	2	Type too variable; D, E, and F splendid type; E possesses best body to our liking in the whole competition.
E. E. Dennis	1	Good size; excellent heads; could do with a little more width in proportion to their size.
A. E. Walters	2	Fail in headpieces; good bodies, low set; colour can be improved.
Kelvin Poultry Farm	1	A good uniform pen.
W. Barber	2	Type not consistent; combs over-developed; low set; feathering of tight nature.
J. Ferguson	3	B and C side spikes; type variable.
W. Morrissey	3	Side spikes on two individuals; otherwise first-class.
J. W. Newton	1	Very even birds of good type; remarkable doers.
B. Chester	2	Too fine and racy; splendid eyes and faces.
C. Goos	2	Good body formation; fail in eye.
H. A. Jones	3	Another finely built, racy class of bird.

DETAILS OF CLASSIFICATION—*continued.*

	Class.	
G. Trapp	2	One small specimen spoils pen completely; good eyes and faces.
J. H. Jones	1	Even, serviceable pen; good doers; size can be increased a little.
Geo. Williams	1	Very uniform; excellent feeders.
Geo. Kettle	2	Type variable; some inclined to beefiness in head.
N. A. Simpson	1	Very even; nice textured combs; good bodies and carriage; shy feeders at commencement, but have improved vastly.
Mrs. N. Charteris	3	Uneven; not as good doers as one would like.
H. O. Jones	1	A solid, close-feathered pen; good bone; splendid feeders.
W. A. Wilson	2	Too fine, especially in bone.
S. McPherson	1	A little more size required; excellent doers.
Oakleigh Poultry Farm	3	On fine side and variable in outline.
S. W. Rooney	1	Size can be improved; excel in stamina and evenness.
Geo. Byrnes	3	Two small birds spoil the chance of four good ones.
R. J. Turner	2	Good bodies and nice size in five birds; pen spoilt by one a trifle small and a bad doer.
Geo. Nutt	1	Very even; typical headpieces; nice shape; good backs; just a little more size wanted.
Burleigh Pen	1	Even, large, big-boned stock; backs a little on long side.
R. B. Sparrow	2	A nice all-round pen; size and shortness outstanding features; one bird too much feather on shank.
H. Ashworth	1	Good size and even combs; a trifle overgrown.
C. H. Singer	2	Nice type, but indifferent feeders.
J. A. Cornwell	1	Another big-boned pen; a little long in back; good doers.
A. Homan	2	Not as uniform as we would like; indifferent feeders at times.
A. Gaydon	2	Type not consistent; one bird possesses side spikes on comb.
J. H. Dunbar	2	Good spangling and type, but too dwarfed.

POULTRY CONFERENCE.

GATHERING AT GATTON COLLEGE.

The Annual Conference of poultry-breeders took place at the Gatton Agricultural College on Wednesday, the 17th September. At 10 a.m. the visitors toured the competition pens and the College poultry farm and brooders. Luncheon was subsequently served in the dining-hall of the College.

THE CONFERENCE.

The Conference took place in the afternoon in the Gymnasium, the Principal (Mr. Cuthbert Potts) presiding. In welcoming the delegates on behalf of the Minister for Agriculture (the Hon. W. N. Gillies), Mr. POTTS said: This is the third consecutive year that the poultry-men of the State have been invited to meet in conference at the College. This year finds a greater number accepting than on former occasions; and we take this as indicating that you, as poultry-men, appreciate this annual gathering as of value, and as of interest to you and your industry. This year we meet under happier circumstances. The war is over; and the dead load of anxiety has passed. We have won, and there now remains the aftermath of reconstruction, with all the urgent problems raised by the world's great upheaval. These problems will not be easy of solution, but conferences such as this must go far to assist. Therefore, while granting the benefit that each and everyone of you must derive from the exchange of personal experiences, I would ask you to render your Conference truly effective by converting idea into action. In all industries there are some common interests—some matters which require concerted action both for the betterment of the industry and the protection of the public. These two concepts are inseparable, for no industry can exploit the public without suffering in its turn, nor can any industry survive unless it receive adequate remuneration. This balance between

opposing forces is normally established by the free operation of supply and demand. The past five years, however, have seen this balance greatly deranged; while the very process of repatriation, involving as it does the establishment of many of our returned soldiers on poultry farms, has introduced a further complication. Are you going to allow natural, unguided forces to re-establish a passable stability in your industry; or are you, consciously and conscientiously, going to bend your best endeavours to the direction of conditions, and so make for a truer stability on which the future development of the industry may rest as on a safe and solid foundation? If I may, I would suggest several lines along which you might proceed:—

(1) To stabilise the prices of eggs throughout the year.

As you all know, eggs vary in price from season to season in a manner which at one time renders this valuable food too expensive for a vast number, while at another season the price is too low to properly remunerate the producer. Taken in large, a stable or more stable price throughout the year would be to the advantage of both the producer and the buyer. Cold storage is probably the solution; but cold storage and the arrangements appertaining thereto will require your concerted action. Such storage cannot hope to be successful if attempted by only one or two.

(2) The efficient distribution of your eggs.

Queensland is a big and widely distributed market. Something might be done by placing the handling of all eggs under a central control, so that grading might be efficiently carried out, but chiefly that eggs in the quantities required might be despatched West and North. This is a marketing operation which is undoubtedly beyond the scope of the individual producer, and could only be given effect to by concerted action. However, this matter will be discussed later on.

(3) The educating of the purchasing public so that they may recognise quality.

This applies most intimately to table poultry, which are now sold under conditions that are patently in opposition to the interests of the careful breeder and feeder. Selling by weight seems to me to be the only solution. This is an alteration of market practice which will require your united efforts to secure. These are only a few points, but they are fundamentals if the industry is to progress on sound lines. They are the concern of both the poultry-farmer and the poultry-breeder; and I could wish to see this Conference elect a small committee who would be empowered to collect information and make tentative arrangements for submission to you next year, or, if sufficient progress can be made to bring the matter before you, sooner. Such a committee, acting, as it would, with this Conference's sanction, would be in a strong position to negotiate in the interests of the industry. Just one other matter. I want to congratulate this year's competitors on the marked improvement both in the type of birds entered and the better weight of eggs secured. Both of these have been effected without loss of fecundity, and there is every promise that breeders will maintain high egg-production together with, and not in neglect of, the characteristic points of the various breeds and the stamina of the birds. I have much pleasure in declaring the Conference open.

STANDARDS FOR "TRUE-TO-TYPE" PRIZES.

The Poultry Expert (Mr. A. G. Harwood) submitted the proposed scale of points which, in future, it was intended to adopt as standards for the "true-to-type" prizes at the College. He invited criticism on the proposed standards, and said that, to a large extent, he had adhered to those of the National Utility Poultry Breeders' Association's points. He had varied them, however, to some extent. He said that, in his opinion, the standards adopted by the associations generally were defective in that they did not provide any limitations in any particular feature. For instance, if it was desirable that a bird should have a long leg, the greatest number of points for this feature went to the bird with the longest leg, no matter whether the leg was out of proportion or not. He had provided a limitation in this scale.

Mr. Harwood promised to forward a copy of the standards to the Department.

Mr. Parker: Will the weight of the egg have anything to do with the judging of the "true-to-type" prizes?

The Chairman: No bird is eligible for any prize unless it lays an egg weighing not less than 2 oz.

Mr. Elms said he had followed Mr. Harwood's remarks very closely, as he was a member of a subcommittee of four appointed in New South Wales, two years ago, to draw up a standard for utility birds. He thought the proposed scale might appear a little complicated, but it was desirable to make a start; and he was pleased that this had been done. The commencement of the whole business was an endeavour to get a bird true to type, consistent with the keeping up of good laying qualities.

He thought it would be a good idea, in order to save Mr. Harwood from criticism, to appoint a committee of three or four from the Conference to confer with Mr. Harwood and prepare a definite scale of points.

Mr. HARWOOD said that the utility birds would have to prove themselves in the laying competitions; but it was the work of those who entered them to follow up the breeding in order to ensure that they will be pure. It was not for him to allot points for all the birds. He should welcome the proposed committee if it was considered necessary.

Mr. DOCHERTY said he did not think 10 points for colour was sufficient. In a White Leghorn, for instance, the colour was taken into consideration in four portions—the eye, the beak, the feathers, and the legs. With this exception, he thought the standards set down were very good, as they would improve the breeding of the birds as well as secure good layers. He was pleased that the standards had been drawn up.

The CHAIRMAN said the colour points only referred to the colour of the plumage, and the colour of the other parts would, of course, be taken into consideration in the judging of those parts. They would notice that there were two standards—one for type and one for stamina, with 100 points for each. They had decided that, unless a bird possessed such stamina as rendered her capable of reproducing herself, she would not be worthy of a prize. It was provided that, unless a bird received 75 per cent. of the total points for any of the standards, a prize would not be awarded, and, also, that a bird must get 50 per cent. for each particular portion. For example, if a bird did not get 50 per cent. of the points for plumage, it was little use examining it further for type. They had set these points for the "true-to-type" prize, and the scales quoted were those upon which it was intended to judge the birds in future. It was not, however, the standard by which they would be judged for admission into the competitions. That would still be decided by the National Utility Poultry Breeders' Association standards. The standards given were for the "true-to-type" prizes. They certainly hoped that they would all send birds that would be eligible for the prize. He thought the position was met by these proposals without the committee proposed by Mr. Elms.

MARKETS FOR EGGS.

Mr. JACOB (representing the N.U.P.B.), in speaking on the need for an improvement in the marketing conditions for eggs, said that eggs, at the present time, were 4s. 6d. per dozen in the North, and they could only get 1s. 3d. per dozen in the South.

Voices: 8d. a dozen.

Mr. JACOB said they wanted to get as uniform a price as possible throughout the State, so that they could have some idea what they were doing. If they could store their eggs, it might be a good scheme. This practice was adopted very successfully in America. In Sydney, last week, eggs took a rise in price owing to the exportation of one big lot. Why was the position in Queensland so unsatisfactory? Because they were lacking in organisation. In reply to a question, he said the high prices of eggs in the North might be due to some extent to the shipping strike, but it was due largely to the high freight on feed.

Mr. WILSON agreed that the chief difficulty was the matter of organisation. They wanted combination amongst the poultry-keepers in order that they might undertake the sending away of their eggs.

A Voice: Co-operation.

Mr. ELMS thought that until the poultry-men were forced by the stress of circumstances to combine, nothing satisfactory would be done. Nothing but co-operation would solve the problem. There were always some keen business men who would take up the work, because it paid them to do so; but until the sections amongst poultry-men were broken up, and a strong organisation formed, they would never be able to reap the benefits that the industry was capable of giving. The poultry-keepers must take it upon themselves to act in such a way that they will receive the full results of the industry they are engaged in. They had the experience of other industries to find out what co-operation had done.

Mr. GOLD (Oakey) said he had been a producer of eggs for over thirty-eight years, and it seemed to him that the poultry business was no better now than it was when he first started in New South Wales. They received almost as good prices then as they did now. This year he had sold eggs at 3s. 6d. per dozen, and now they were worth about 8d. in the markets. Thirty-eight years ago he had also sold eggs as high as 3s. 6d. per dozen, and they had been as low in price as 4d. per dozen in the periods of the year when the farmers produced a great quantity of eggs. Poultry-men needed a Poultry Board to draw up rules and regulations formulated by

poultry-men in their own interests. There were some farmers who did not keep poultry which were as well bred for egg-production as those kept by some poultry-men in the towns and cities, but they laid well in certain seasons of the year, and it was when all these eggs came in that there was a glut in the market. The farmers also sent out fertile eggs which were affected by the warm climate and were not too fresh when the consumer received them. They needed to educate their farmers to produce eggs which were not fertile, and so improve the quality of their eggs. It behoved the fanciers, and poultry-men generally, to stand together and endeavour to formulate some plan for the improvement of the quality of the birds in some places, and for the purpose of stabilising the industry, in order to be able to put eggs on the market when prices begin to soar and to regulate the prices when they go down very low, thus securing to the poultry-man a fair return for his labour.

The CHAIRMAN said he was particularly pleased to hear the remarks in regard to the necessity of the poultry-men combining for the purpose of controlling their own produce. The men who had been making profits out of the eggs would continue to do so if they held their individuality to be sacred; and these men would be willing to continue to make profits out of the poultry-raiser. He was pleased with Messrs. Prescott, Limited, for having done something in the matter of marketing, even if it was for their own benefit. Their action had benefited the industry in the South to some extent; and he knew that it paid them to take the action they had taken. He did not think they could adopt a better plan than to appoint a small committee to draft a scheme for consideration at the next Conference. If they wanted legislation, there would have to be a strong enough public cry for this legislation.

A Voice: We can do it by organisation and co-operation.

The CHAIRMAN: No doubt you can get what you want by organisation. The matter had a patriotic side. There were many former members of the A.I.F. who were taking up poultry-farming, and they, like others, would, under the present conditions, have to put eggs on the markets when they were glutted. They could see, therefore, that they could do something for the returned soldiers as well as for themselves in this matter. (Applause.)

Mr. GOLD thought that the Conference should appoint seven men to draw up rules and regulations for the purpose of securing a better distribution of eggs throughout Queensland. He thought the Conference, representing, as it did, so many poultry-yards, was sufficiently strong to do this work, and should have sufficient backbone to get a scheme on paper at least. They should be prepared to take the lead in the matter, as the producers of butter and cheese had done. As co-operators they sent away more cheese and butter than any other individual or combination in the Commonwealth.

Mr. CAMPBELL seconded the motion, and remarked that in New South Wales the system of combining for the distribution of the product of poultry-runs worked well.

Mr. BYERS (Gatton) said the N.U.P.B.A. had had the matter of co-operation amongst the breeders in view for some time, and he thought the poultry-breeders should support the Association, and give their leaders in Brisbane a chance of doing the work for the poultry-breeder that they were anxious to do. There were several men belonging to the Association who were giving their time and money in the effort to bring about an improvement in the conditions, and many of the breeders stood back, and thus did not give them the opportunity of doing the work they desired to do.

Mr. R. HOLME: (Toowoomba) said he thought they should let the Association do the work.

The CHAIRMAN said they had waited for the N.U.P.B.A. to do something; and now he asked those present, as poultry-breeders of the State, to deal with the question. He did not think it was right for the Association to wait until nearly every poultry-man joined the organisation before they started to do something.

Mr. GRAVES agreed that the time had arrived when the Conference should take some action. He thought it was necessary that a co-operative society should be formed for the purpose of dealing with the distribution of eggs as well as to deal with the purchase of feed for the fowls.

Mr. JACOB said the N.U.P.B.A. worked for the good of the industry generally. If they were going to have a limited organisation, they were going to slip. The Association had been endeavouring to get a co-operative society formed. They were continuing in this work, but they had been greatly hampered by the lack of support from the poultry-men. With the co-operation of the breeders, however, they would come out on top in the end. He moved, as an amendment, that the Conference ask the Association to formulate a scheme and report to this Conference.

Mr. ELMS seconded the amendment, and suggested that the Association be asked to get into touch with other similar bodies in the State, and endeavour to arrange a system of working together. Then they would have something tangible to work on. He did not think it would be fair to take action independent of the N.U.P.B.A.

The amendment was carried.

The CHAIRMAN said that there appeared to be a large number of members of the N.U.P.B.A. present, but, now that they had carried this motion to ask the Association to do something for them, he hoped that they would all not only become active members but also see that others would join the Association and support it in the work it would have in hand. (Applause.)

In reply to a request that the Association should endeavour to give poultry-men assistance in the matter of learning more of the industry, Mr. JACOB referred to the official journal of the Association—namely, "Utility"—which he said contained a good deal of information of interest to poultry-men.

POULTRY FEED.

Mr. HINES spoke on the desirability of utilising Queensland summer-grown crops for the purpose of feeding fowls. He said they were all aware what a difficult time they had had during the last few months in getting decent feed. During the dry times that were experienced in Queensland from time to time, the wheat crop had been almost a failure, and they had not had a very large quantity to draw their supplies from. These supplies had come very largely from the South, and, owing to the shipping difficulties, they had not been able to get the wheat through at a reasonable price. The question they had to consider was: How were they going to get their supplies in case of emergency? Personally, he would get no other feed than wheat while he could get it at a reasonable price; but circumstances altered cases; and he thought they could get from other cereals a ration which would pretty nearly fill the bill. If they had a good maize season, he thought they might be able to utilise this grain. It had very large fattening properties, but this might be neutralised by using more green feed and by adding more protein matter. Then there were grains of the millet families which may make very good rations. Unfortunately, he had no data at hand regarding the analysis of the different grains, but he was sure that they might be able to balance these feeds, and so make, perhaps, as decent a ration as wheat and pollard provided.

Mr. WILKINSON asked what was the matter with maize. They grew more of this crop in Queensland than any other crop. He had tried maize; and if it was equal in price with other feed, he would take it every time. He had found that wheat was not any better.

Mr. HINES did not agree with the speaker. He had found, when he was obliged to use maize, that the egg-production of his run dropped 20 per cent.

Mr. WILKINSON: In that case, the change of ration may have been made too suddenly. He had fed on maize, and did not think the egg-production of his place dropped at all. He had found that it was not a good thing to feed the same kind of ration all the time, but to give his poultry a certain amount of maize and a certain amount of wheat. From his experience, if he could get maize at 3s. per bushel and wheat was 4s. 6d., he would prefer to have the maize. He did not think he could make up the difference.

Mr. HINES: I think I could. Maize is more fattening than wheat, and it creates internal fat to a greater extent than appears. It was not only more fattening but it was more heating.

Mr. BURNS (Warwick) said that birds confined in a small pen would be likely to fatten too much on maize.

Mr. FANNING said this was largely a matter of opinion. He had had no difficulty in getting feed.

A Voice: No; you live in Brisbane. (Laughter.)

Mr. FANNING said that poultry-men generally did not understand the different quantities of ash and other ingredients there were in their feeds, and in regard to a balanced ration he had found that Thorpe's feeds were very good. The firm had the different ingredients analysed, and they knew the percentages of different foods in each. No matter what they were feeding, poultry liked a change like anyone else did. He liked to feed a certain amount of wheat and a certain amount of maize. They needed some fat.

The CHAIRMAN said the discussion had drifted somewhat from the point. The question was, whether or not Queensland summer-grown crops could be utilised for feed as well as wheat.

Mr. GOLD said he had found that a very good catch crop, and one which would grow in practically any Queensland climate, made a very good feed. He referred to well-developed Soudan grass seed. It would grow a tremendous crop of seed. He had fed a lot of this seed to his poultry, and he had not found that they failed in constitution or in egg-production. Unless the seed was well developed and dry, however, it had a detrimental effect on the poultry. It was a good crop for the farmer to grow a little of, with which to feed his poultry. It would grow in large quantities, and was easily threshed and easily fed. Then another good feed was Japanese millet. He found that a due proportion of this, with other feeds, made a splendid ration. He thought these foods were worthy of the attention of the poultry-farmers.

The CHAIRMAN thought Queensland was inclined to follow hard-and-fast methods too much, and to copy the South too much. Queensland was not such a good wheat country as New South Wales and other Southern States. They were more a maize and millet growing country; and if they proved that these crops were good for feed for fowls, then the feed difficulty would be largely solved. He hoped to be able to devise experiments during the next year in which the value of the various foods would be tested; but, owing to the dry weather, he had not been successful in accumulating the various foods. He did not think that Queensland, with all its powerful summer growth, should be dependent upon winter-grown crops for feed for fowls. He would like the assistance of everyone in conducting these experiments, and he hoped that some of the gentlemen present would be able also to conduct some experiments and report to the next Conference.

WEIGHING OF EGGS, ETC.

Mr. WILSON advocated the weighing of eggs more often than once in the year. He said the weight of eggs varied, and, in order to arrive at the real value of the hen, it was necessary to have the eggs weighed at least four times a year. He quoted figures showing the result of regular weighing of eggs, and bearing out his contention in regard to the varying of the weight. He suggested that some steps should be taken to provide better shade over the pens.

Mr. PARKER congratulated the College on having put the 2-oz. standard as a condition of entry into the competition pens. In the past, breeders had sacrificed weight to numbers; but the College, in adopting the 2-oz. standard, had done something to prevent this. He hoped that, in future, competitions would be decided on the weights of the eggs laid during a particular period. He thought that, in the interests of the improvement of the breeds generally, the weights of the eggs should be taken at least as often as suggested. Mr. Wilson had proved by the figures he had quoted that men might be unfairly penalised under the present system. At Birkdale it had been proved that the weather affected the size of the egg. Personally, he thought the hen that laid the 2¼-oz. egg was just as big a culprit as the one which laid a 1¾-oz. egg. In regard to the shade over the pens, he knew that this was a difficult matter. He thought some litter might be provided for this purpose, and also that some litter should be placed on the floors of the pens. This would not only provide scratching material, but would also provide a certain amount of moisture, and would prevent the ground from getting hot as it does now.

The CHAIRMAN said Mr. Wilson's figures were particularly interesting, but they supported, to a certain extent, the system that was in vogue at the College in connection with the weighing of the eggs. He understood that the product, not only of fowls, but also of animals generally, varied about 14 to 15 per cent. He had borne this in mind, and he had found that the variation worked out at about 14 per cent. They had weights as low as one-sixteenth of an ounce. This was equal to a second decimal place. Under the system, if an egg weighed a little under one-sixteenth of an ounce less than the 2 oz., it was counted a 2-oz. egg, and so on. A medium was struck between the two extremes in the weight of the eggs from the one bird which were taken for the purpose of discovering the weight. Under this system, he thought the weighing was a pretty accurate estimate, even if it was only done once. The figures given by Mr. Wilson supported the variation they allowed in the weights under the present system. He could not guarantee to weigh the eggs three or four times during the year. They did not take one egg. They took six eggs from the individual pens and thirty from the group pens, and struck an average. They would understand that to go through the whole of the pens, as suggested, would mean a pretty heavy task. However, he was willing to take, say, a dozen pens, and weigh them three or four times, in order to demonstrate that the present system was not far out. He thought they would be honestly surprised at the result.

In regard to the matter of shade, Mr. Harwood said he would like to see how they were going to keep litter over the pens during the weather that they had had

lately. They must remember that there were 260 competition pens, and 160 on the other side; so that the suggestion involved a rather big task. He thought, however, that they achieved something since last year; and he would see if it was not possible, during their spare time, to plant some more beans around the pens similar to those which grew over the old pens. But they had to do quite a lot of things during their spare time.

It was suggested that pieces of hessian might be put up to protect the birds from the sun.

The CHAIRMAN said the roofs of the pens were specially constructed for ventilation, and 6 inches beneath the roof there was absolute air temperature. There was no striking down of heat.

Mr. WILSON said that what was wanted was a shed almost immediately in front of the pens. He thought a growing shade of some kind was the best for the purpose. He recognised that Mr. Harwood was a very hard-worked man, and it seemed to him unfortunate that some assistance could not be obtained for him, so that he could devote his attention to the technical part of the work.

The lucerne tree was suggested as a good means of providing shade.

Mr. HARWOOD said it would involve a lot of work to provide shade for each pen.

A BREEDER: It is cruelty to dumb animals to keep them in the pens as they are at the present time, especially when the summer comes.

Mr. HARWOOD said the low number of cases of heat apoplexy proved that the heat was not so trying as was suggested.

Mr. HINES said he noticed that the College was becoming short of green feed for poultry. The College had its own water system, and he thought something might be done to irrigate a piece of land for the purpose. Green feed was an important feature.

The CHAIRMAN said they had not the water supply, as Mr. Hines would see if he inspected it.

Mr. HARWOOD said that at present he was feeding on milk thistles. He must have green feed for the fowls. They had been taught a big lesson in this matter last year, and he know how important it really was.

Mr. ELMS asked whether the water which flowed through the troughs in front of the pens could not be utilised for the purpose of irrigating some of the land near by on which to grow greenstuff?

Mr. HARWOOD said this was being done to some extent, and they might have noticed some rape growing near some of the pens. This was being irrigated by the water from the pens. All this meant additional work.

Mr. WILSON thought someone should be appointed to do this class of work.

The CHAIRMAN said he did not deny that Mr. Harwood was a hard-working man, but they could not kill a man's enthusiasm; and he did not think he could kill Mr. Harwood's enthusiasm, even if he desired to do so. (Applause.) Probably if he had fifty assistants Mr. Harwood would be the hardest-working man on the place. Then there was the question of expense. This was not only a poultry college, but he was frequently being asked whether it was. He desired to make it the best poultry farm in the State, and he believed that it was that, even now; but other departments must receive their share of attention and expenditure.

AN APPEAL FOR ASSISTANCE.

The CHAIRMAN read an apology from Mr. Manson, the leader in the competition at present, who asked that the matter of making further contributions of laying hens to the Grange Red Cross Convalescent Hospital, Brisbane, be placed before the Conference. A number of those present readily responded, and it was announced that over thirty birds had been promised.

Subsequently Mr. PARKER made an appeal for contributions to the College Honour Board, and a collection was taken up for that purpose.

The visitors were subsequently entertained at tea, where, on behalf of those present, Mr. Parker accorded hearty thanks to Mr. Potts and his officers for the manner in which they had been treated. Mr. POTTS acknowledged the vote of thanks, and said he hoped they would have a succession of successful conferences of the kind.

HATCHING MUSCOVY DUCKS.

By R. T. G. CAREY, Beerwah.

Many mistakes occur when hatching Muscovy ducks, which result only in failure. When these birds desire to lay, they seek a most sheltered position if range fed, but if penned, of course, their nests are somewhat artificially prepared by their owners. Always out and away from draughts, the nests are hollowed on the bare ground, and raised six inches above the ground level, where the Muscovy duck will deposit her eggs, as she loves to guard her nest while laying, so that their keeper can accurately identify the particular duck which is the rightful owner of the nest from any of the others in a flock, by her walking round one's back when approaching it, and uttering a faint, shrill cry. Each morning an egg is added until twenty or thirty eggs are laid, when she immediately broods, sits, and hatches almost every egg.

Repeatedly have clients written to me telling about their non-success in hatching these beautiful ducks! Why? The chief cause stated appears to be the result of fussiness, over-anxiety and interfering with the nest, or forgetting that it takes *five weeks* for these duck eggs to hatch, and sprinkling and moistening them with tepid water.

Do not touch, handle, or interfere with their belongings once their bed is made and a few eggs are therein laid. Instinctively they have a recollective idea of the number of eggs that were laid and ought to be therein from day to day. For that reason, it is wisest not to meddle with, or remove, any eggs during their laying season. If you do so, you invariably cause them to forsake that nest, or perhaps they will choose a new locality, and are even apt to go off the lay. When eggs are required to be taken away, do so after five are laid, or seven, always leaving the odd count, and remove the eggs during the feeding time; in the early morning for preference. You can daily visit their nest-kiosk at any time during their absence on "sentry go"; ascertaining the number of eggs laid, or if sufficiently sheltered from the sun's rays; or should there be any need to erect a break-wind, likewise making it rain-proof, or any other such alteration as can quietly be performed during her absence. Make sure that the sun's rays do not reach the eggs, as the effects are fatal, nor does any water need to be sprinkled on them during hatching. Once the Muscovy duck has settled down to brooding and sits close, make her snug. She can then be handled like a hen and will not then forsake her nest-kiosk. Remember that five weeks is the duration required to hatch those duck eggs.

Every morning or in the evening the broody duck leaves her nest, to feed and obtain water. She is distinguished by the ruffled feathers, the red colour on the face changing to a yellowish tinge; also a particular waddle—*i.e.*, between a run and a walk—suspiciously, anxiously, and hurriedly moving about, first to water, then to food and toilet. When satisfied, she returns to her nest-kiosk. Do not worry or get fussy or anxious should she remain off her nest for a lengthy time. Her nest is so well protected, and the eggs covered securely over with beautiful soft downy feathers which keep them warm and free from chill, that the mother hatcher can assuredly stay off for several hours at a time. If, owing to a thunderstorm, the rain should happen to flood the eggs in the nest, do not worry. Provided that rapid drainage carries away the water immediately, no ill effects or any retardation arising therefrom prevent them from hatching, because those eggs are coated over with a strong solution of oily or greasy material, which acts as a waterproof coat keeping the inner membrane from being affected through a deluge. I will illustrate the above fact from my own experience. Last season, nine ducks were sitting, having made their nest in low places, between a couple of tufts of grass. Three hatches were in the advanced stage of one month's incubation, when a severe storm came late in the afternoon, and swamped all the nine nests, causing the eggs to float, and the mother-hatchers were standing full length up off their eggs. An hour thereafter they had nestled down as if nothing had occurred. Two of the nine were flooded twice, and I am glad to record that all the nine hatches came off most successfully. Only two eggs failed, and those were unfertile, therefore the above incident demonstrates that nature did provide for such a case by imparting to the eggs that greasy or oily solution to ward off a deluge. It strikes me that these ducks, in a natural state, must have been accustomed to construct their nests in dangerous places, which were liable to be flooded through rivers rising, or swamped through heavy rains, and yet hatched and reared their young through such misfortunes as the above. Therefore, never worry or get fussy about the ways of those beautiful Muscovy ducks when they are nest-forming, laying, or brooding; because they are quite capable of managing their own nest-kiosk and brood.

When the eggs are about to hatch, and the young ones pip the shell, they remain for some hours before beginning to effect their severance from the incasement of the shell. Thus the raising of broods is a fascination and one of the greatest delights

of the duck breeder. At the moment of the duckling's birth it is covered with what is apparently a layer of hairs—not with a covering of downy fluff. Those hairs rapidly dry and by some process begin to uncurl or unfurl themselves into what is termed down. That is their first garment. The brood when complete, and all well dried up, can be removed to its brooding quarters along with the mother, when they will within a week have gained agility and sprightliness so amazingly rapid that freedom may be allowed, when by judicious care and management they will thrive amain.

Generally, every duck this month, or by the middle of November, should have got off her first season's brood. If, after a couple of weeks mothering her young, she be removed to a mating pen, she will have a good hatch reared again for you in the month of February, which is termed second season's hatch; the management being correct, a third season's hatch gives equally good results for market purposes. Finally, do not trouble too much about the laying, sitting, or brooding duck, as she does her work perfectly when left alone. The writer has now on the market a book absolutely on the Muscovy duck and its management, for the small cost of 1s. 3d., post free.

WHEN HENS EAT EGGS.

Egg-eating sometimes becomes a serious vice, fowls becoming very fond of eggs when they have learned to eat them; and it often spreads from fowl to fowl. It usually begins through accident by eggs being broken or frozen. Be careful to see that this does not happen. See that the nests are properly supplied with straw or other nesting material and have them darkened, so that if an egg is accidentally broken the fowls will not be likely to discover it. Supply plenty of lime in the form of oyster shells, bone, or similar substances to ensure a firm shell. As soon as it is discovered that a fowl has formed the habit, the fowl should be removed, in order to prevent the spread of the vice. Once formed, it is difficult to eradicate, and the safest remedy is the death penalty.

Fowls sometimes pluck feathers from themselves and from each other, which is often caused by too close confinement, by the presence of insect pests, or by improper feeding. When some of the fowls of a flock have formed the habit slightly, a wide range with a change of diet, including a plentiful supply of animal feed and freedom from insect pests, will usually correct the evil. Above all, see that the fowls have plenty of inducement to exercise. If the habit becomes well formed, it is very troublesome and may necessitate the killing of some of the fowls in order to stop it.—"Weekly News Letter."

RECORD FLIGHT OF A CARRIER PIGEON.

A New York telegram to the London "Daily Chronicle," dated 16th July, says:—

The steamer "Westkysa" has brought into port a carrier pigeon which alighted on the steamer on 11th July in an exhausted condition.

It is presumed that this pigeon is the one which escaped from the R34. It has been handed over to Colonel Thwaites, the British provost marshal in New York.

It was 1,000 miles east of Sandy Hook—about a third of the distance across the Atlantic—says another telegram, that the pigeon boarded the steamer. If all facts are as stated, the bird has probably accomplished a record non-stop flight.

R34 had two pigeons on board for emergency purposes as messengers, and one of these escaped through a window of one of the gondolas before the airship left Long Island on her return journey on 9th July.

There is an instance of a homing pigeon accomplishing a flight of 1,100 miles in America, but that was across country, and the bird could rest at night, as is the habit of carrier pigeons when on long distance journeys.

The pigeon must have been ahead of the R34 during the journey home.

SEED COTTON PRODUCTION IN 1918.

In the September issue of the Journal the quantity of seed cotton ginned by the Department of Agriculture in 1918 was, owing to a typographical error, given as 106,458 lb. This should have been 166,458 lb.

Viticulture.

GRAPES FOR EXPORT.

REMARKABLE QUALITIES OF THE OHANEZ VARIETY.

In continuation of our article from "The Fruit World," which appeared in the October issue of the Journal, we take the following notes from the same source:—

"The production of grapes on a commercial scale has much to commend it. The vines come into bearing early; there is a big local demand for the fresh fruit; on the other hand, grapes may be grown for the dried fruits trade, and for wine making.

"The growing of grapes for export to oversea markets is of itself capable of developing into a big and important industry, apart from the features enumerated above.

"While grapes grow and bear well under many conditions, there are certain conditions under which the vines do particularly well.

"The purpose of this article is to enumerate those conditions and to emphasise the value of the grape, variety Ohanez, for planting, for these reasons:—

1. Ohanez grows well in Northern Victoria, where the soil and climate are exceptionally favourable.
2. It is a choice grape, a heavy bearer, possesses a strong skin, and is appreciated on local and interstate markets.
3. It is a grape of excellent quality and size, and is the finest grape for export, carries well, and opens up fresh in oversea markets.
4. The export of Ohanez grapes is profitable, and shipments from Australia, packed in cases containing from 25 to 30 lb. net, realised up to 33s. per case.
5. The variety is well and favourably known in the London and other markets. Large shipments are annually sent abroad from Spain. These arrive in winter, and under unfavourable conditions as regards the season. A market exists which consumed upwards of 2,500,000 barrels of approximately 53 lb. net per annum. *Australian-grown Ohanez grapes arrive in the European summer, and realise treble the prices of the Spanish grapes,* and if the quantity was available, the market could take equal to the quantities shipped from Spain without affecting the price. The illustration on this page is of one of the barrels of Ohanez grapes shipped from Spain to London. This particular barrel was reshipped under instructions from the Fruit World Pty. Ltd. from London to Melbourne as ordinary cargo, and the grapes arrived in excellent condition after a voyage of 12,000 miles.

"When the information published in our September issue relative to the prospects of growers of theOhanez grape has been carefully considered in conjunction with these facts, there is every reason to predict a very big and profitable future for this field of viticulture. This industry, in Victoria, although quite in its infancy, was entered into from the point of view that the Ohanez grape was suitable for shipping, and no idea of developing a local market was then considered. War conditions, with the curtailment of freight, have proved that we have in Australia a market for the Ohanez that might never have been touched had normal conditions existed. At Merbein, in Victoria, there are upwards of one hundred acres planted to Ohanez grapes. The average tonnage of fruit of suitable shipping quality has been about 9 tons to the acre, and the gross returns, as reported by growers, have been up to £210 per acre. The yield speaks well for the productivity of this vine under Victorian conditions, and the price has been obtained by exploiting the magnificent storage quality of this remarkable grape. Quoting from a leaflet issued by Mr. F. de Castella, Government Viticulturist of the Department of Agriculture, Victoria, he states, in regard to Ohanez grapes for export, 'This branch of viticulture presents very great possibilities.

"Prior to the outbreak of war, several successful shipments were made. Curtailment of shipping space during war time proved a severe check; but with the return to normal conditions, there should be a great future before this branch. Owing to the six months' difference in the incidence of our seasons as compared with those of

Europe, America, and Asia, we are enabled to ship our grapes to all countries north of the Equator without fear of local competition. Our grape shipping season lasts from the end of February to June. The duration of the voyage is less than six weeks.'

"Grapes of the Ohanez variety, which have been in cool storage for six months, are exhibited at the Victorian Royal Agricultural Society's Show, and are in excellent condition, there being less than 1 per cent. of waste. No other variety has stood up so well in this test as the Ohanez, and thus another confirmation of the superiority of this grape over all varieties as a storage and shipping grape has been demonstrated. There are a number of important factors regarding this industry that are bound to carry weight with those looking to the land as a means of livelihood; among the more important of which are the following:—

"*Bearing Age.*—Vines planted wth proper care should reach a productive stage in three years from planting. Thus, a distinct advantage over many other branches of horticulture is evident; the waiting period is a short one, but sufficiently long for the unskilled settler to become thoroughly acquainted with the methods of pruning, cultivation, and packing necessary to the successful conduct of the business.

"*Export.*—The market for this grape, when exported, is assured, provided proper care and attention is given to packing. The great populations of the world are all north of the Equator, so that growers in Australia are in a unique position to develop this industry to their advantage.

"*Storage.*—The storage qualities of the Ohanez variety are such that an added safeguard to this industry is available by means of cool storage, thus making it possible to spread the marketing for local consumption for a period of six months after harvesting.

"*Soil and Climate.*—The soil and climate conditions of Northern Victoria are exceptionally suitable to the Ohanez variety, where it thrives admirably, yielding heavy crops of grapes of excellent quality."—"The Fruit World."

KILLING GREEN TREES WITH ARSENICAL POISON.

Trees to be killed with arsenical poison are first rung or "frilled," by making downward cuts with the axe, completely round the trees, each cut well overlapping the adjoining one, so as to leave absolutely no unsevered section of bark in which the sap could flow. The cuts must be made right through the bark into the wood proper, and as close to the ground as possible, say from 6 n. to 12 in. up. The poison, prepared as given below, is poured into this frilling right round the tree, using an old teapot or kettle, as the spout makes pouring easier, and prevents wastage of solution. A large tree of 4 ft. in diameter may require about 1 quart of the solution, smaller trees proportionately less. Small saplings and suckers may be cut off level with the ground and thoroughly swabbed with the poison.

Trees may be killed by ringbarking or by frilling combined with poisoning at any time, but unless a suitable season is chosen suckering is likely to take place. From May to July is probably the best period of the year to carry out the work successfully. In the winter months the sap is assumed to be down, and therefore, at the end of autumn and during the winter, the trees and undergrowth are more easily killed.

Preparing the Poison.—The arsenic may be dissolved with the aid of caustic soda or washing soda. When using the latter boiling from half an hour to one hour is necessary before all the arsenic is dissolved. Under ordinary circumstances 1 lb. of arsenic and 2 lb. of washing soda, or ½ lb. of caustic soda, to 4 gallons of water is of sufficient strength to kill timber, but when it is a question of making doubly sure, and kill more quickly in the case of vigorous saplings, the solution can be used double strength. The preparation and mixing is best done in an empty kerosene tin, which holds 4 gallons. When using caustic soda mix 1 lb. of arsenic and ½ lb. caustic soda (soda ash) thoroughly in the dry state, and gradually and carefully add water. Sufficient heat is generated to dissolve the whole of the arsenic. Make up to 4 gallons and finally stir in ½ lb. whiting, which latter indicates readily which trees have been treated. If washing soda is to be used mix 1 lb. of arsenic and 2 lb. of washing soda into a paste with some water; add about 2 gallons of water, and boil from half an hour to one hour until all arsenic is dissolved. Make up to 4 gallons, and add the whiting.

There is not much danger to stock grazing on areas treated by poison, and the leaves fallen from the poisonous trees would not contain any poison, but it is safer to keep the stock off such areas for some weeks, as they might lick some of the poison from the frills on account of the salty taste.

Horticulture.

ON ROSES.

Complaints are generally made by amateur gardeners of their non-success in growing the rose in this State; one being that some kinds flower so poorly, and the other that the flowers produced are so inferior to the same kinds grown in different climes. Hence the conclusion generally come to is that Queensland cannot produce really good roses. However true this is generally, yet an improvement can be made in this the queen of flowers in our gardens. Care is necessary as to nature of soil and to the kinds grown.

At present the system invariably is to procure cuttings, and stick them in in various parts of the garden without any special preparation of the soil, leaving them until they bloom or not in their misery; the natural result is disappointment, and would be the same in the best rose-growing country.

The rose is a gross feeder, requiring rich deep-drained soil, either natural or artificial, with a plentiful use of rotten cow manure, which on account of its cool nature is the best manure for this plant.

Broadly speaking, roses are classified into three kinds by their habits—hybrid-perpetuals, tea-scented, and climbing. Hybrid-perpetuals are recognised by bearing long and straggling shoots springing from a common base, which in wet seasons never flower, and even in the most favourable seasons flower so poorly as to be disappointing. They require special pruning—these strong shoots are shortened to twelve or twenty buds from the bottom, so as to direct the energy into a variety of channels, and so weaken them into flowering. Complaints of the flowerless nature of this kind of rose are so general, and their treatment so peculiar, that their growth will be largely discontinued, with the exception of a few which have proved suitable to our climate; La France being a grand exception.

In pruning tea-roses which natuarally form a bush, the object is to keep them so by first cutting out all weak central and overcrowding branches, and by reducing the plant to 2 feet or 3 feet from the ground, cutting each shoot and branch to two buds.

The principal pruning may be made in July, and will cause the plants to flower in the spring when the temperature is not too severe; although the peculiar nature of each season must determine the best time; and by pruning successionally the flowering season is prolonged over a longer period.

Immediately after the roses have faded each shoot should be at once cut back to three or four buds, as then the next formed shoot will be stronger than if allowed to grow at the extremity of the shoot, and thereby at least two crops of flowers can be got in one year. No unnecessary or unprofitable shoots are allowed to rob the plant, which is also kept low and does not require so severe an annual pruning; the balance is maintained between growth and use, and neatness is preserved.

Every two or three years large rose bushes should be lifted—their roots and branches shortened to 1 foot or 18 inches from the stock according to the strength of the plant, and replanted, not too deep, with plenty of manure. The plant is thus induced to form fibrous roots near the surface of the ground and a check is given to the natural tendency of the roots to wander often into sour and unhealthy soil. In every case heavy mulching should be done; the benefits are invaluable, protecting the surface roots from the sun, preventing too rapid evaporation, and supplying nourishment with every shower. At the time of the greatest drain on the plant—namely, when in bud—it can be very much helped by giving liquid manure as well as reducing the number of buds. Soapsuds are a simple and effective fertiliser and in all cases should be used for such purposes.

The pruning of climbing roses differs considerably from that of the other kinds. As a rule, only old and exhausted shoots should be cut out. The young shoots, though long and without branches, if put down will form flowering twigs all along the shoot. In many climbing roses the best flowers are produced on the thin twigs, whereas in Climbing Devoniensis they are produced on clusters at the extremity of a long shoot.

Tea and climbing roses are by far the most successful in this climate, as one good crop of flowers can be depended on, and by careful attention and pruning and other necessary helps a succession can be got; those pruned now and flowering from July onwards will be the best of the season.

Another important question in rose growing in this State is, whether budded or on their own roots. Budding roses on the wild briar and manetti stocks had long been practised in England, but even in that climate experience has shown its fallacy—budded roses have proved so liable to canker and other diseases, besides the nuisance of suckers springing up and often taking the place of the scion and flourishing for years without the owners finding out the mistake. As in the orange in this climate, the unsuitability of constitutions seriously affects the prolonged health of any two differing budded or grafted kinds, and most roses make a better struggle through life with one constitution than with two. Roses procured from the Southern States are often budded and it is important to increase as soon as possible by layers or cuttings. Layering can be best done from February to July, and is the safest way to increase any choice kinds. Shoots of wood not too old or too young if slit up the middle for an inch or so from below a joint and buried in fine soil about 3 inches deep, keeping the shoot firm with a peg and keeping the slit open, will root in a short time and when rooted will at once form a plant.

In increasing by cuttings let the wood be firm, the cuttings about 6 inches long and cut clean at bottom of a joint and buried to one eye in sandy soil.

The rose is liable to diseases which much be watched, mildew being the chief. It can be held in check by sprinkling with flowers of sulphur, but is a sure sign of the roots being in an unfavourable condition and is often cured by lifting and pruning root and branch as recommended above.

In working among roses it is very important to have pruning scissors, especially as the most enthusiastic rose-growers are ladies, on whom all duties relating to the garden very often fall. This useful instrument is preferable to a knife, as all cutting can be done without danger to the hands.

List of good roses suitable to Brisbane.—La France, h.p., Souvenir de La Malmaison, b.; Marie Van Houtte, t.; Safrano, t.; Alba rosea, t.; Duc de Magenta, t.; Souvenir d'un ami, t.; Perle de Lyon, t.; Niphetos, t.; Anna Oliver, t.; Celine Noiret, t.; Mademoiselle Th. Genevay, t.; Marie Sisley, t.; Marie Nova, t.; Queen Victoria, t.; Bougère, t.; Devoniensis, t.; Madame Carnille.

Climbing.—Maréchal Niel, t.; Gloire de Dijon, t.; Cloth of Gold, N.; Madame Berard, t.; Climbing Devoniensis, t.; Lamarque, N.; Celine Forrestier, N.; Reine Marie Henriette, t.; Chestnut hybrid; Rêve d'or, N.; Solfaterre, N.

PAPER PULP.

Mr. J. Campbell, of Cairns, who has for several years been identified with the cotton-growing industry in the North, and who has furthermore experimented with plants producing fibres, dyes, tannin, &c.—in which work he has been very successful—has now shown the way to an apparently lucrative business in the utilisation of "blady grass" in the manufacture of paper pulp. The "Cairns Post" has the following note on the subject:—

"It takes 3 tons of green blady grass to manufacture 1 ton of crude pulp, while it takes, at least, 7 to 8 tons of sugar-cane to make 1 ton of brown sugar. Delivered in the Southern Paper Mill, the pulp is worth, at least, £21 per ton—a value equal to that on 1 ton of sugar. Under present conditions the cost of manufacturing the pulp is greater than that of making sugar, owing chiefly to the fact that chemicals are dear and the machinery and appliances have not been perfected; but Mr. Campbell can show not only how to make good use of local crude alkalis, but, also, how to bring the application of his method up to sugar-mill standard, thus greatly decreasing the cost of manufacture. This would mean that a higher price could be paid for the grass—in fact, a price equal to that of sugar-cane, say £2 per ton green—making 1 ton of hitherto useless blady grass (considered a pest and a curse by the cane-farmer), growing without cultivation, equal in value to 1 ton of the best cultivated sugar-cane."

We ("Queensland Agricultural Journal") shall be very pleased to hear that Mr. Campbell's experiments achieve such a result, as it would be of exceedingly great value to Australia generally; and would doubtless give rise to an extensive business in Papua, where there are large tracts of land on navigable rivers, notably the Kemp Welsh River, covered with a luxuriant growth of this hitherto pest of the planters. And it must not be forgotten that native labour in New Guinea is cheap, plentiful, and reliable.

Dairying.

HOME-MADE CHEESE.

Take, say, 10 gallons of milk, which should not be sour, but should have developed sufficient sourness or lactic acid necessarily to be present in milk intended for conversion into cheese. Milk drawn from the cow at the evening and kept overnight, when mixed with equal quantities of the morning's milk (freshly milked), and providing the evening's milk has not gone sour generally, meets the requirements.

This milk should be put into a clean, tinned vessel, about 2 ft. long by 1 ft. wide by 1 ft. deep, which should stand in another vessel 2 ft. 6 in. by 1 ft. 6 in. by 1 ft. 3 in. deep, and should rest on three pieces of wood laid on the bottom of the larger vessel, which will bring the top edge of the inside vessel a little higher than the outside one.

Hot water is then poured into the outside vessel, and the milk in the inside vessel should be stirred with a wooden pat till it reaches a temperature of 86 degrees Fahr. Should the water used at this period be of sufficient warmth to further heat the milk, it should be drawn off by a water cock inserted in the bottom of the outside vessel, and this water can be put back into the heating boiler if desired. When the milk is 86 degrees Fahr., add about 15 drops of cheese colour and stir thoroughly. Then add about ½ oz. of rennet, and stir for two minutes. Cover with a cloth (a piece of calico answers), and let the milk rest until coagulated and it is of such firmness that, when you insert the finger into it and raise the finger to the surface bent forward, the junket will make a clean break in front of the finger. This stage usually takes from 25 to 60 minutes from the time of adding the rennet, according to the sourness of the milk and the strength of the rennet. This stage of the process requires careful attention. When the junket reaches the condition above described, it should be cut into cubes about ½ in. square. For this purpose a vertical and a horizontal curd knife are used. The curd is first cut lengthwise with the horizontal knife; then crosswise and lengthwise with the vertical knife. The curd is then stirred for a minute with the hands or a pat. Then more boiling water is run into the outside jacket, and the curds and whey brought up to a temperature of 100 degrees Fahr. This should take about 20 minutes. By this time the curd should be firm to the touch. A small piece (about the size of a walnut) of the curd should then be taken and squeezed dry in the hand, and placed on an iron which has been heated to an almost red heat. The curd should be firmly placed on the iron, on a part that is just hot enough to hold the curd but not burn it; then draw the curd gently away from the iron. If sufficient acid has developed, it will be noticed that small threads about ¼ in. long adhere to the iron. If the curd has not developed an adequate amount of acidity, these threads will break away, or, if very sweet, the curd will not show any threads at all. In the latter cases, the curd must be kept at the above temperature or not allowed to fall below 98 degrees Fahr. until the curd shows thickly-populated threads, ¼ in. long, on the hot iron. When this is accomplished, the whey should be drawn from the curd. This can be done by shifting the curd to one end of the vessel, and dipping the whey out at the other. The end of the vessel should then be raised to allow the whey to drain away from the curd. After the whey is drawn off, the curd will readily become matted, and it should then be cut into blocks about the size of bricks, and turned over. The turning should be repeated about every 10 to 15 minutes to allow the whey to drain off. In the course of about 40 minutes, the hot-iron test is again brought into requisition, and a piece of curd applied as before; and when the curd shows fine threads about 1 in. long, the correct acidity for cheese purposes has been attained. This usually takes from about an hour to an hour and a-half, after drawing off the whey. The curd is next cut into pieces about the size of broad beans. There is a mill for this purpose, but a small quantity of curd can be cut with an ordinary butcher's knife. This completed, the curd is stirred with the hands just sufficiently to separate any pieces that may have united. Then add 4 oz. of fine salt (or at that rate), and mix thoroughly. In 7 to 10 minutes the curd is ready for hooping and pressing into cheese. For this amount of curd you would require two 5-lb. 7-in. cheese hoops and half-dozen yards of 7-in. binder. The half-dozen yards of binder are sufficient for 100 cheeses of the weight above mentioned. After the curd is put into the hoops, it should be pressed for 20 to 24 hours under a ton pressure. If the milk is too sweet at the outset, it takes a long time to get the required acid (hot-iron test), or, if too sour, the acid is developed too rapidly, and the cheese will be sour and probably leak on the shelves. Try and strike the medium. A nice time for completion of the process is about 4 hours from the time the rennet is added to the milk until the curd is in the hoops preparatory to the application of pressure.

Tropical Industries.

THE NORTHERN SUGAR DISTRICTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has returned to Brisbane after an extended visit to many of the Northern sugar districts. The Innisfail district received most attention, due to the initiation of a new Sugar Experiment Station at South Johnstone. This establishment is situated on the opposite bank of the river from the South Johnstone Mill; and, the buildings being now completed, a commencement has been made with cultivation. The cultivable area comprises about 30 acres of land of medium quality. Varieties of cane which were sent up to the Kairi State Farm, on the Atherton Tableland, in 1913, for the purpose of, if possible, restoring the vigour and vitality of some of the better of the older varieties, were brought down to the new station for planting out. These comprised Rose Bamboo or Rappoe, Meera, and Mauritius Gingham. At the time these canes were sent to Kairi it was thought advisable to include the canes known as New Guinea 15 and 24 A (Badila and Goru), and these were also brought down to Innisfail. It is hoped that the long spell they have had on the Tableland will reinvigorate these varieties to such an extent that they will be of the greatest value to cane-farmers, and it is expected that distributions will be able to be made next year. In addition to these canes, many varieties from Java, Hawaii, Mauritius, and other places have been sent up from Mackay and Bundaberg Sugar Experiment Stations. The plantings also included cane for experimental trials and for revenue purposes. The new station is completely fitted up, and a laboratory has been installed for the analyses of soils, manures, limestones, and sugar-cane. This station should prove of the utmost benefit to Northern cane-farmers; and it completes the system of Sugar Experiment Stations, there being now Southern, Central, and Northern Institutions.

The weather during the General Superintendent's visit was dry; but the whole country looked beautifully green, and the soil moisture was particularly good. The sugar contents in the cane were high, and farmers were obtaining a very satisfactory price. The South Johnstone Mill was working smoothly and satisfactorily, and the growers were generally feeling more satisfied and confident of the ultimate success of the mill. At Babinda the mill is dealing with an enormous crop of some 150,000 tons of cane, and will need to work at high pressure in order to get through. The density of the cane here was somewhat low at first, but it has recently considerably improved. After leaving Babinda—where, like Innisfail, everything was green—the regions of Mulgrave and Hambledon were reached. Here the rainfall has been much below the average, and the whole of this country was urgently in need of rain. The sugar content in this year's crop, however, was exceptionally good, and high prices are being paid for cane. Unfortunately, owing to the shipping strike, the Mulgrave and Hambledon Mills were forced to close for many days, on account of the shortage of sugar-sacks. This was at the time when the cane was at its best, and must lead to a reduction in the total amount of sugar to be manufactured. A great deal of planting was going on for next year, in spite of the dry weather; and, fortunately, since the time of the visit referred to some rains have fallen which will be of great assistance. It is considered, however, that the crop now being harvested has been reduced by 12 per cent. since the original estimate was formed.

On the Herbert River conditions were even drier than at Cairns, and rain was at that time badly required for the young plant cane, of which considerable areas had been planted. The sugar contents in this district were also particularly fine, and the high sugar content in cane should tend to considerably increase the ultimate yield and atone to some extent for the mills having to stop for bags. Just before leaving the district, good showers fell which will materially aid next year's crop.

At Mackay very dry weather was being experienced, and no rain had fallen for a long time. The young plant cane for next season now requires rain urgently. The sugar contents in the cane in this district are also very high—a matter of great satisfaction with farmers. Clark's Seedling (H.Q. 426), a cane of high density, is now being extensively grown; but a good deal of anxiety is being felt as to its permanence. In many of the sub-districts of Mackay it is developing disease. The sticks are inclined to die and wither in the middle, while the foliage also dies away. This disease strongly resembles one that attacked the old Rappoe or Rose Bamboo in 1902-4 in the Mackay district.

The Mackay mills were all crushing, and most of them were doing good work.

The Sugar Experiment Station work was found to be going on satisfactorily, and distribution of new varieties had been made to a large number of farmers; plantings of new experiments had taken place, and the harvesting of this year's crop was almost complete.

Throughout the North a good deal of planting had been carried out, so with fair climatic conditions a good crushing for next year in the Northern districts should be ensured.

Dry as some of the Northern districts appeared (continued Mr. Easterby), they were relatively moist when compared with Bundaberg. Here the cane has made no growth for months, and of what there was a great deal had been frosted. Bingera Mill ran for a very short season; Millaquin and Fairymead will soon close up; and it is anticipated that the amount of sugar to be manufactured in the district will be under 7,000 tons. The Childers district is even worse than Bundaberg; planting in both districts has been considerably interfered with, and, unless rain falls shortly, next year's crop will also suffer materially. It may be summed up, therefore, that, while the sugar areas north of Townsville and also Mackay will yield fair to good crops this season, the Lower Burdekin and Bundaberg and Childers districts will be very short and reduce considerably the amount of sugar usually made. It is estimated that we shall be quite 100,000 tons of sugar short this year.

Meetings of farmers were held on the Johnstone and Herbert Rivers, which were well attended, and many questions important to canegrowers were discussed.

SUGAR PRODUCTION ESTIMATE FOR 1919.

The General Superintendent of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) states that the probable estimate for the 1919 sugar crop is in the region of 155,000 tons. This is considerably lower than that formed about May, and is due largely to the long continued drought and the damage caused by frosts in the southern sugar districts. The sugar content in the cane this year fortunately is very high, otherwise the output would have been still lower. Compared with last year, there will be a reduction of 35,000 tons of sugar made, and 152,714 tons less than were manufactured in 1917. The variation is due largely to climatic reasons, but the high prices of implements and fertilisers, and the scarcity of the latter during the past two or three years, has had a deterrent effect upon production.

RICE-GROWING IN THE NORTH.

For several years little has been heard concerning rice cultivation in Queensland. But, from a report received by the Director of Agriculture (Mr. H. C. Quodling) from the Northern Instructor in Agriculture, giving progress results of the efforts of the Department of Agriculture to encourage the growing of Upland rice on the Atherton Tableland, it would seem probable that the cereal may again take a prominent place in Northern agriculture, as it did some years ago, when a rice mill was erected at Cairns. The Department distributed a quantity of rice seed amongst the Atherton farmers; but owing to the scant rainfall during the growing season, the results were unsatisfactory as far as grain was concerned, the bulk of the crops having to be cut for hay. There was, however, as a set-off a good demand for rice hay chaff, which readily sold locally at £16 per ton. Where grain was harvested, many offers were received for the "paddy," or undressed rice, at £24 per ton f.o.b. Cairns. At this price the grower would receive a gross return of about £15 per acre, a very satisfactory return, equal to a 60-bushel maize crop at £10 per ton.

At the State Farm at Kairi, near Atherton, a plant for hulling and polishing the rice has been installed. Although the quality of the rice grain of this season is not as good as that of previous years, it is said to be quite equal to the imported rice.

In and previous to 1916, Mr. J. F. Keane, of Carbean, Mareeba, always had a crop of rice, and was enthusiastic in his advocacy of its cultivation on a commercial

scale. In the year mentioned he obtained a yield of over 40 bushels of grain (paddy). The straw averaged from 4 to 6 ft. in height, and each stool averaged about 20 ears. He stated that 24 oz. of paddy would be sufficient to sow an acre. An experimental sowing of 3 oz. resulted in a crop of 5 bushels.

In 1899 mention was made in the annual report of the Under Secretary for Agriculture of the then position of rice-growing in Queensland as follows:—

"This (rice) is becoming a staple grain crop in North Queensland, the area for 1898 showing an increase of 418 acres over 1897; that for the former year being 863 acres, with a yield of 38,133 bushels, or an average of 44.19 bushels to the acre, as against 29.19 for 1897. Hitherto, rice had been in the experimental stage, having been grown in many parts of the State, and had fluctuated in area as success or non-success had been met with. It was, however, in 1897 settling down to be the property of the Northern District, and it is to that part that the future supply may be looked for, and it behoves the farmers to be careful to grow the variety to suit the market, for, of all grains, rice is most subject to prejudice and favouritism. It is the grain that, in the largest quantities, comes into the hands of the consumer in the form that is mostly allied to the original state, and so is dependent upon the fancies of the consumers for the variety which shall command the highest price."

From the figures of the Registrar-General, Queensland, in 1899, produced 14 per cent. of its annual consumption, the statistics being: Production (estimated at the rate of 162 lb. of paddy to the 100 lb. of clean rice), 1,318,176 lb. of clean rice; and the imports 8,235,564 lb., of a value of £49,456. The principal district for rice is that of Cairns, which produced 82 per cent. of the total yield, 708 acres being cropped for 33,540 bushels, or an average of 47.30 bushels per acre.

Only one year later the cultivation of rice had fallen to 319 acres, producing 9,275 bushels, averaging 29.08 bushels per acre.

How are we to account for this great decrease? Is it owing to the cost of production, to the poor variety grown, to the yield per acre, or to the price obtained? Take, first, the average produce per acre. This varies from 30 to 60 bushels of paddy, and even much higher returns have been obtained in the Pimpama district, near Brisbane, where Mr. A. J. Boyd introduced the growing of rice on his sugar plantation, "Oremau," about the year 1872, and where there is ideal land for rice-growing.

The bulk of the Queensland-grown paddy had usually been sold at 6s. per bushel—that is to say, that an average 40-bushel crop brought the farmer a gross return of £12 per acre. At this rate 1½ acres of paddy gave 1½ tons, equal to 1 ton of clean, marketable rice, worth from £19 to £24 per ton, and the pollard is worth £2 per ton (the pollard in 1919 would bring £10 per ton). The yield of straw amounts to from 3 to 4 tons per acre, worth in 1899 £2 to £3 per ton. In 1919 (October) this rice straw chaffed sold at £16 per ton.

The cost of production and harvesting are about the same as the cost of wheat production. The cost of milling, polishing, &c., amounts to about £2 per ton. Thus, it will be patent to any agriculturist, that there is more money in rice cultivation than in wheat, barley, oats, or maize, the cost of production being about equal.

It cannot, then, be that this item is the cause of the slump in rice-growing.

Now, as to the poor variety grown. No doubt, in former times, when few had any knowledge of the industry, all kinds of rice were sown, mostly of unsuitable varieties; but, thanks to the Department of Agriculture, the very best kinds were introduced, the kinds which yielded the heaviest crops of the most marketable kind of grain. This disposes of the argument about quality and quantity. We have already shown that the yield per acre far exceeds that of wheat, and that the price paid for paddy was much above what is paid for wheat, and over double, what was paid for maize. How, then, is the abandonment of rice culture to be accounted for? In the first place, rice was mainly grown in the North by Chinese. Although the Chinaman is a perfect slave as an agriculturist, yet, if he finds a crop which demands little or no cultivation, but which will return him a rich harvest, and another which will also return a rich harvest, but which demands a considerable amount of labour, he naturally chooses the former. The former was presented in the shape of bananas, and the consequence was that he abandoned rice-growing and took to banana production. This accounts for the failing of the industry in the North.

But, why did the white men in the South give it up? Simply because they were disheartened by their losses in the great drought. Rice had failed them, and they took to sugar and arrowroot, corn, and potatoes. Why they should have done so is

one of those things no fellow can understand. The land most suitable for rice was theirs. So good was the land considered that its value rose from £2 to £8 per acre. Many persons still hold the belief that rice can only be grown in swamp land which can easily be flooded, and that the crop must be labouriously transplanted by hand, and kept continuously flooded until the grain is almost ready for harvesting.

This is quite true where swamp rice is concerned. But there is another kind—the Upland or Mountain rice—which requires little more moisture than wheat or oats. This last is the variety which has been planted in Queensland, and from which such excellent yields were obtained. There is no need to describe the method of sowing and harvesting. Those who know anything of wheat culture may with rice adopt the same methods as in the case of wheat. Rice, however, is cut while the straw is still green, with the result that a second crop is obtained, almost equal to to the first. It is well to stack rice for a fortnight after it has been cut. It then undergoes a sweating which hardens and whitens the grain.

There used to be two or three rice mills in this State capable of dealing with a large crop, so that farmers growing rice had no difficulty in disposing of their produce.

We hope that the rice-growing industry is on the eve of revival in Queensland, as there is, unquestionably, more money in it than in many other rural industries.

The facilities in this State for profitably growing such products as sugar, coffee, cotton (particularly cotton), tobacco, flax, and rice are so good that we have little doubt that, eventually, when our rural and other population shall have doubled itself, their production will figure largely in our lists of exports.

Sugar, butter, and meat have long ago reached the export stage, the former interstate, and wheat has also been exported to some extent.

RICE-GROWING AT BULIMBA.

In proof of what can be done in rice-growing, we received, in 1914, from Mr. C. F. Dennis, Hawthorne road, Bulimba, a magnificent sheaf of rice. It was grown on alluvial soil at the foot of a hill. The depth of the surface soil was about 2 feet, with a subsoil of pipeclay. The area planted yielded at the rate of 60 bushels per acre. The heads were well developed and the straw was from 4 to 5 feet high. The seed for this crop was obtained from a well-known local seedsman, Mr. Thos. H. Wood, and germinated freely. The straw was finer than that of oats, with which it compared more than favourably with oats for chaff. The crop was sown on 10th January, 1914, and harvested on 8th May of the same year.

PADDY FOR THE DISTILLERY.

Mr. J. F. Keans, above quoted, stated that he once made a voyage from Europe to Japan in a French mail steamer, which cruised entirely round the two islands, and through the inland sea, picking up paddy at every port touched at. About 5,000 tons were collected, to be used in Holland in the making of square gin. He was informed that the insoluble constituents of the grain would be converted into pulp for the manufacture of cigarette paper, and the chaff (pollard) into wrapper paper. Owing to the long voyage 100 tons of the rice were damaged, but he was told that there would be a profit even in that, for from it is produced a size used in rope and textile fabrics. He remarks that Port Darwin is 5,000 or 6,000 miles nearer to Amsterdam than Nagasaki, and wild rice grows right across Northern Australia from the Pacific to the Indian Ocean. Nothing is more certain than, that if it can be shown that any foodstuff or merchantable commodity can be more economically and abundantly produced in one place than it can in another, money will find its way to it. Coloured labour cannot compete with the combined harvester. There were some thousands of Chinamen in South Australia thirty-five years ago, and they fled to a man before the wheat-stripper.

Science.

POISONING PRICKLY PEAR.

REPORT BY J. B. HENDERSON, F.I.C., AND PROFESSOR B. D. STEELE.

At the invitation of the management of the Cactus Estates Limited, Mr. J. B. Henderson (Chairman of the Queensland State Committee), and Professor B. D. Steele, a member of the same body, were asked by the Executive Committee to visit some of the stations where the company was operating, and forward a report. This was done, and the report is here appended:—

Mr. Henderson interviewed the manager, Mr. J. G. Gregory, at the office of the Cactus Estates Limited, Creek street, Brisbane. Mr. Gregory stated that the company had abandoned the attempt to clear the 100,000 acres at Dulacca, and no clearing was now being done there, as the cost would be about £7 per acre, and the land was not worth it.

He stated that a contract had just been completed for clearing 12,660 acres of lightly infested country at Noondoo Station, about 120 miles beyond Goondiwindi. The pear had been poisoned and burned off. A copy of a letter from the manager of the Noondoo Station with reference to the work was submitted by Mr. Gregory, and is enclosed herewith.*

Mr. Gregory also stated that a contract was just about to be completed for clearing 100 acres of thickly infested pear country for £700 at Umbercollie Station, near Goondiwindi. It had all been poisoned, and would probably be burned off in about a fortnight. He submitted a copy of the contract, which is enclosed herewith.†

VISIT TO UMBERCOLLIE.

On Wednesday, 25th June, 1919, we left for Goondiwindi, and on Thursday, 26th June, went over the work being done at Umbercollie Station. When we reached the station, the manager, Mr. Heathcote, accompanied us to the paddock, where the Cactus Estates foreman, Mr. Archibald, showed us what had been done.

Pear at Umbercollie.—Mr. Heathcote stated that Umbercollie Station has an area of 50,000 acres, surrounded on three sides by dense pear. Of the station area, 37,600 acres has been kept free from pear, and we were informed that it costs 4d. per acre to keep it clear. There are three paddocks—one of 1,700 acres, one of 10,000 acres, and one of 700 acres—covered with more or less dense pear. It is a 100-acre portion of the 700 acres paddock which is now being cleared for £700.

Reason for Clearing.—Mr. Heathcote also stated that the 100 acres are being cleared to give good access to some permanent waterholes. It is not proposed to clear the other infested areas on the station, as the cost would be much greater than the value of the land.

State of 100-acre Paddock.—We found the 100 acres block in a much less forward state than we expected. Mr. Archibald stated that there were still about 30 acres to spray, and that it was not expected that the burning-off would be attempted until October next.

Relatively few of the pear plants had been killed outright by the poison so as to show no signs of growth in any part of the plant.

The great bulk of the plants had completely collapsed, but were showing green shoots plentifully from many segments; green shoots were common from the "bulb," and seedlings were springing up among the dried or semi-dried segments.

A considerable number of pear plants were only slightly affected by the poison, the plant still standing with merely the outside skin covered with a yellowish, corky layer. These plants had either not been sprayed or only very lightly sprayed, or the poison had been washed off by rain before it had time to penetrate. In any case, they are very much alive, and the corky layer will largely protect them from further spraying. The presence of those plants will render the task of burning-off a difficult one.

* The report shows that the cost of clearing, allowing for wear and tear, is slightly over 7½d. per acre.

† he contract is for 100 acres, and the cost of clearing is £700, or £7 per acre.

Cost of Clearing.—According to the contract, to "kill by poison and clear off by fire the pear" on the 100 acres is to cost £700.

The labourers are being paid £3 10s. per week. There have been from six to ten men employed for over two months in poisoning work. There are still 30 acres to be poisoned, and the work of felling the scrub and burning-off and clearing up odd pear has still to be done. It is obvious that the Cactus Estates Limited is not going to make much profit on this contract.

Conclusion.—As the so-called dense pear in this paddock is not nearly so dense as in many other districts, we are convinced that poisoning, as carried out by the Cactus Estates Limited, is much too costly to be considered as an economically possible means of clearing off pear of even medium density.

Statement of the General Problem.

The results of the visit which we have paid to Umbercollie Station confirm in a striking manner the conclusions that we had formerly arrived at as members of the Board of Advice on Prickly Pear Destruction, and we consider that it will not be out of place to recapitulate briefly these conclusions.

In considering the possibility of eradicating prickly-pear it is necessary to classify the infested areas into at least three classes, each of which presents its own definite problems.

The first class consists of heavily and moderately infested areas, mostly of poor agricultural land but good grazing value. This group consisted a few years ago of areas each centering around a more or less definite area of infestation. These areas are now tending towards coalescence so as to threaten the great bulk of the pastoral lands of the State. They now cover enormous areas.

We are definitely of the opinion that it is impossible to treat this class of country economically by means of poison. This conclusion is based on the information at our disposal, and by the results of about 10,000 plot experiments carried out under the auspices of the Board of Advice on Prickly Pear Destruction in Queensland. We consider that settlement under present conditions is powerless to cope with this class of country, which will be cleared or controlled, if at all, only by the discovery and utilisation of natural enemies of the pest.

This method has already been used with conspicuous success by the introduction of the Wild Cochineal Insect, which has practically exterminated a large area of *Monocantha* Pear. Unfortunately, this insect will not attack any other variety of pest pear in Queensland.

Pending the discovery of some enemy or enemies which shall destroy or control the pear, every effort should be made to prevent the further spread of the pest. This should be attempted by the combined use of settlement and poison.

Belts of pear country, surrounding each large area of infestation, should be carefully selected. Each of these belts should comprise land in such a condition of infestation that it can be economically cleared by the use of poison. Settlers should be established on these cleared belts, which will completely enclose the very heavily infested areas. These settlers should be granted a tenure of the most favourable nature with the condition, which should be strictly enforced, that they must not permit the pear to spread on to their selections. Portions of the belts at present occupied by pastoralists should be brought under the same condition.

2. The second class of pear country consists of infested areas of very large extent, containing more or less scattered clumps of pear. These areas are scattered about the country in patches, and they surround the heavily infested areas on all sides, joining up the centres of infestation already referred to, and tending by the increasing density of the pear which they carry to spread the first class over the whole of the infested area.

This class of country, which will be outside the protective belts suggested in the foregoing, can be cleared at a moderate cost by the use of suitable poison applied at the proper season, the dead or seriously injured pear being subsequently destroyed by burning.

It is probable that cost of doing this will in some cases be higher than the value of the cleared land, but notwithstanding this it should be undertaken as a national problem.

3. The third class consists of very light infested areas situated on the extreme edge of the other two classes of infestation, and also scattered areas in process of development, where seeds have been carried by birds and cattle.

There is no difficulty at all in clearing such country and in keeping it cleared at a comparatively trivial cost by the use of suitable poison. The task of doing so does, however, call for constant attention on the part of the settler, and the duty of devoting this attention is one that should be emphatically and repeatedly brought to his notice.

It is to be noted in connection with this problem that roads, reserves of land, and Crown property are in some districts left uncleared where the pear has otherwise been cleared. This infested land remains a source of reinfestation for the whole district. It is essential in connection with any plan for clearing any district that such roads, reserves, &c., should be cleared and kept clear at the same time as all other infested land in the district. Unless this is done, a quite unnecessary expense is entailed on the surrounding landholders, and the cost of keeping clear remains a permanently occurring expense instead of being a quickly diminishing quantity.

The problem of attempting to cope with the prickly-pear in Australia is one which will severely tax the administrative and material resources of the community, and this fact should be clearly stated and borne in mind by the Governments concerned.

THE TASK AHEAD.

HOW SCIENCE CAN ASSIST. A WIDE FIELD OF ENDEAVOUR.

By F. M. GELLATLY, LL.D., in "Science and Industry."

There are some most important problems facing Australia to-day which can only be solved by patient scientific research. Take some trite instances, for the bigger things have been much discussed, though little that is practical has been done. There stands in the forefront the prickly-pear menace, one that threatens to drive the inhabitants of Queensland, and the northern portions of New South Wales, into the sea. It has already enveloped 20,000,000 acres, and is estimated to be extending at the rate of 1,000,000 acres a year, or, say, 5 per cent. Consider what this means! Those mathematically inclined may exert their ingenuity and tell us precisely how long the prickly-pear, at its present rate of progress, will take to infest the whole continent at 5 per cent. increase per annum compounded. Remember the story of the grain of wheat on the chessboard doubled at each square. The Persian potentate had no mind for figures. He did not realise that his consent to rewarding his victorious general by doubling a grain at each square represented more than the whole of the wealth of his Oriental domain. So with prickly-pear. If nothing be done to stem its fateful advance, the 20,000,000 acres to-day given over to this pest will, in fourteen years, be 40,000,000; in twenty-eight years, 80,000,000; in forty-two years, 160,000,000; in fifty-six years, 320,000,000; in seventy years, 640,000,000; in eighty-four years, 1,280,000,000; and in less than a century, 2,560,000,000 acres, or more than the whole area of the Commonwealth. By that time the annual increase would have reached over 125,000,000 acres. These figures are not so fanciful as they seem. They convey, even to the unimaginative mind, what prickly-pear, spreading at a present rate of 1,000,000 acres a year, may mean. What a task for a brainy entomologist, or biologist, or chemist! The other day, the Minister for Lands in Queensland remarked to the writer that the Government of that State would willingly give any one a free grant of 1,000,000 acres of pear land if only the grantee would guarantee to clear it. What a prize!

Now, take cattle tick. That pest has caused millions sterling of loss to the cattle raisers of this country. It is costing the State Governments of New South Wales and Queensland scores of thousands each year, not to exterminate it, but merely to keep it from making further encroachments. This problem is not peculiar to Australia. The Americans are facing it too. They are driving the tick back slowly but surely, at great expense, with the aid of an army of officials. They dip and quarantine, dip and quarantine, and so on slowly and painfully cleaning it up. There may be an easier and a cheaper way, if only we can find it. Here is a task for a biologist with a brain.

Then again, there is the sheep-fly and the nasal-fly, braxy in sheep, black disease, contagious abortion in cattle, as well as tuberculosis and all the other ills that stock are heir to. These afford ample scope for the entomologist, the microbiologist, and the rest. The denizens of the north and the west build their homes on piles, not, as is the case with the tree-dwellers of Papua, to keep out of reach of human foes, but to keep their houses free from the depredations of the white ant, the scourge of

sub-tropical and tropical lands. The scientist who discovers a way of combating this insect really effectively, and without entailing over much expense, will save hundreds of thousands sterling per annum. Here is a chance for the chemist possibly, or possibly the entomologist, or possibly for a combined effort from both. The borers that eat into the piles upon which our wharfs rest have still to be dealt with at the hands of science.

Quite another series of problems have peculiar application to the larger centres of population. The smoke nuisance, the dust trouble, if properly tackled and overcome, will materially reduce the daily labour of countless housewives, and add much to the general health and comfort of the community. Neither of these evils should be insolvable. The disposal of city garbage should be dealt with on more scientific lines, and greater use made of the by-products of its distillation. The waste products of countless factories should be put to fuller and more systematic use. In the past, we have been prodigal of our resources. We can no longer afford that luxury. We burn coal by the million tons each year, and allow 40 per cent. of its value to go up the flue. The dumps from our mines, and the slag from our furnaces, have still unknown riches to yield up. The sands of the sea, the water of the ocean, can, at a price, be made to yield unseen gold; so can the modern alchemist transmute many seemingly worthless things into substantial banking accounts for the enterprising and the skilful.

The scour from the wool-wash is rich in potash; the common seaweed on the beaches contains iodine; the water hyacinth, potash; sawdust from the timber mills, acetic acid, alcohol, and tar; straw can be converted into a valuable illuminant; the essential oils of our bush plants into additions to the pharmacopœia, and so on *ad infinitum*. The resources of the Commonwealth are well nigh inexhaustible, and will yield untold wealth to the scientifically-trained mind.

Or let us consider that important work, the scientific breeding of plants and animals. It has been universally accepted that he who makes two blades of grass grow where one grew before deserves well of mankind. Apply this principle to agriculture, and consider it in reference to the cultivation of wheat. Farrer has proved what may be accomplished by selection of wheat and scientific hybridisation. He has added millions sterling to the value of the annual production of Australia. But he confined his efforts to wheat only. What about maize, barley, oats, sugar-cane, cotton? What about our native grasses? What about our orchard trees? Let any one who has visited the average orchard recall the poor trees he has seen. A poor variety of, say, orange takes just as much out of the soil as the best does, and requires just as much cultivation. Yet its product may not be worth one-half or even one-fourth as much. So with stock-breeding. Our flocks and herds are susceptible of immense improvement as soon as the benefits are fully recognised. Consider what the sheepbreeders of Australia have already done; how they have added pounds per sheep to their average yield of wool. Wonders still remain to be accomplished right throughout the whole world of live stock.

There is an entirely different set of problems, the solution of which cannot but bring credit to the Institute and benefit to the country. Australia, on account of its isolation, gains and loses something compared with other countries. In war she cannot easily be attacked, her boundaries knowing no other frontier than the sea. On the other hand, if she is attacked and her sea-borne commerce is temporarily cut off, she must be self-sufficient in order to be able to continue to fight. Her ships, her motor service, her aircraft, must have an ample supply of liquid fuel. To-day they are dependent upon petrol produced in America or Borneo. It rests with our scientists to discover a substitute—some raw material that will yield up industrial alcohol in an economical way. There are plenty of known raw materials, but most of them are too costly. The low temperature distillation of coal may be the solution of the problem, or it may be that the huge shale deposits of the Wolgan Valley may yet be the salvation of Australia.

Industrial efficiency in a nation is largely dependent upon three or four cardinal factors—(1) well-trained workmen; (2) cheap fuel; (3) cheap and effective transport; and (4) organisation. Take these factors in order and consider what part the scientist can play in each. First there is the efficiency of the workman. This is contingent upon effective technical training; upon his health, which rests upon comfortable housing and scientific sanitation; upon his contentment, which depends upon his general surroundings, and upon his feeling that it is not a hopeless task for him to provide for a comfortable old age for himself, and opportunities for his offspring equal to those of the most influential in the land. Secondly, cheap fuel goes to the root of all secondary, and some primary, industries. This must be had at any cost. Thirdly, cheap and effective transport includes not only railroad and steamship carriage, but that no less important factor, transport by road. Scientific roadmaking

and maintenance is one of the most important *desiderata* in Australia to-day. Most of our roads are execrable, which throws a heavy and perpetual burden upon all industry. If the Institute could introduce up-to-date methods of roadmaking into the Commonwealth, and do no more, it would more than justify its existence. Then there is the remaining factor of organisation. This is many sided. It connotes such matters as the proper selection of factory areas so as to secure efficiency in handling and convenience to the workers. Take the position to-day in Melbourne, Australia's first manufacturing capital. Here the factories are mixed up in residential areas, often far removed from the railway and wharfage accommodation; often, also far from the homes of the workers. This kind of Topsy-like growth spells costly production, and inability to compete on equal terms with more efficient rivals. Then there is quite another phase of organisation, that inextricably connected with the word standardisation. Are manufacturers to be asked to consider every fad, every prejudice, of a hundred and one consumers, or is there to be some limit, and consequently some possibility of economy, in production? Then, again, are dozens of manufacturers going to continue to produce according to scores of patterns, or are some to have a virtual monopoly of some lines and others of other lines, thus still further aiding economy of producton and ability to compete? Standardisation is a weapon of great fineness. It can win where the cruder weapon of the protective tariff fails. Without standarisation as a condition precedent no tariff wall could have been built high enough to have made it possible for Australian manufacturers to roll tramway rails in Australia with our present population, and consequently limited demand. There is another side to standardisation. How long is the Commonwealth going to be content to be the dumping-ground of the rejected goods of the world? Watches that will not keep time; thermometers that cannot once, except by accident, accurately measure the temperature; matches that will not strike; boots that will not wear; and a thousand and one things that are mere frauds may come into the Commonwealth to-day with impunity. One day science will fix standards of quality as well as standards of size and weight. It is a shame that our producers and our manufacturers are compelled to compete against such obvious deceptions, and that our consumers are not protected against such transparent fraud. Science must and can help. This will come within the province of the Bureau of Standards.

It would be impossible, even were it desirable, to cover the whole field that lies before the scientific workers of the Commonwealth. Their labours affect every home, every occupation, every aspiration. They go to the very root of our material progress, of our national well-being, and of our racial security. Who ever had a greater task!

AUSTRALIA'S HIDDEN OIL WELLS.

WHAT PETROLEUM MEANS TO A NATION!

Mr. George D. Meudell, whose efforts to that end have earned for him the title of "Pioneer of the Modern Petroleum Industry in Australia," is distinctly of the opinion that this Commonwealth of ours is rich in fuel oil deposits. Mr. Meudell, who has spent many months in the United States, is thoroughly conversant with the ways and means of locating and marketing natural oil deposits, and for that reason he has directly appealed to members of Parliament throughout Australia and to the Press, urging their co-ordination in the founding of a petroleum industry in Australia.

Mr. Meudell further states that the Federal Committee on Public Accounts inquired last year into the causes of failure of the Government's efforts to produce oil from the oilfields proved to exist in Papua and that the committee's recommendations were as follows:—

"Urgency of production.—The committee is of opinion that the urgent requirements of Australia demand that prospecting work in Papua should be prosecuted with great vigor; that investigations as to supplies of 'well-oil' throughout the Commonwealth should be undertaken, and that the shale-oil deposits of the Commonwealth should be developed without delay."

Mr. Meudell's optimism is founded on these salient facts:—

"Australia, as a great mineral country, possesses all the metals, also all the earths and minerals known to science, and it would be extraordinary if petroleum had not been included in the category.

"The chief reason oil has not yet been found in Australia is that, with one exception, no proper modern drilling plant had ever been used by men understanding how to bore for oil.

"Water-boring appliances and water-seeking engineers have proved fatal to the creation of a petroleum mining industry.

"Rotary drilling machines used in California can bore 200 feet a day, as deep as 6,000 feet.

"Petroleum is found in most of the earth's rocks, and especially under the tertiary rocks—sandstone, limestone, and shale—and three-fourths of Australia is covered by these rocks.

"The essentials for its collection below are:—(1) An anticlinal or 'saddle-reef' formation; (2) a hard, impervious rock, preferably a shale, just above and just below the oil-sands.

"The indications are seepages of oil, bitumen, brine, rock salt, salt lakes, lignite, gypsum and natural gas.

"The most powerful argument in favour of the existence of oil in the Commonwealth is that this country possesses deposits of coal, brown coal, and kerosene shale unequalled in extent on earth! Coalfields indicate petroleum near-by, and oil-wells usually exist alongside coal.

"The supplies of petroleum are falling off in North America, our chief source of supply, and an oil and kerosene famine here would not be remarkable."

Mr. Meudell's contentions are logical, and his advocacy of a national search for oil throughout Australia must meet with warm seconding from the universal body of leaders of industry and commerce in Australia.

Turning from Mr. Meudell's reasoning based on hard practical experience of the American oil-fields, we are confronted by the disturbing evidence furnished by geology and experience of another kind that there is a gradually falling-off in output of the crude oil-fields at present being actually operated in many parts of the world. The drain on the world's oil-fields for war and home service alike is to-day enormous, and even oil-fields are not inexhaustible.

Strictly speaking, each field passes through only a transitory phase of existence as an oil producer, and from current literature on the subject one gathers that the world's annual consumption of petroleum has reached a total of nearly 50,000 tons and that the economic life of an oil-field is probably not more than 50 years!

In the United States, preliminary estimates indicate that the quantity of petroleum produced and marketed in its oil fields in 1917 reached the record-breaking total of 341,800,000 barrels—a quantity nearly 14 per cent. greater than the former output of 300,765,158 barrels established in 1916.

The salient features of the industry in 1917 were record levels reached and firmly maintained by prices of crude oil at the wells, and the enormous demand which absorbed not only the current output of the wells but necessitated a net draft of about 21,000,000 barrels of oil in storage, principally in California and Illinois. The surface reserve of crude oil in the United States at the end of 1917 was estimated at 153,000,000 barrels.

War-time service in the oil fields is expressed by the vast increase in the use of hydro-electric energy in the drilling of new wells and in the pumping of the oil itself. It is by the use of electrically-operated pumps that the oil is taken from its natural bed below the earth's surface. From the temporary lakes created from the output of the pumps the oil product is then taken and loaded, still by electric power, into cars or storage tanks. The largest portion of the oil is, however, pumped directly to the seaboard through pipe lines which are being operated at the present time to their fullest capacity to facilitate railroads in coping with car shortage.

But before we in Australia need to consider how we shall work our own oil fields and transport their produce, we must first find our oil-bearing areas. To quote George D. Meudell once more:—"The Federal Government should spend £500,000 a year and each of the State Governments £100,000 a year in drilling for oil. The drill and not the geologist will sooner or later find oil in vast quantities."

During the period of the shale oil industry in New South Wales, the export of shale at a high price for gas-making and the 6d. gallon duty on kerosene contributed largely to its success, but the duty being discontinued and the demand for export shale practically ceasing, the price of shale gradually diminished to such a small amount as to destroy all possibility of profit from that source. There are large areas containing an abundant supply of raw material of good quality shale, and the industry, if properly established, would be an avenue of employment for a considerable number of hands and the local production of lighting, spirit, lubricating, and fuel oils. But the difficulties which the local industry would have to face would be exceptional, inasmuch as its competition with the products of natural oil wells would be conducted under unequal conditions.

The petroleum industry in the United States originated in the drilling of wells for brine and the observation that gas and oil were usually found with it and throughout the globe. This association of gas and petroleum with salt, either in solution or in the solid state, is almost universal.

The most important hint in the existence of oil in depth is a seepage of the fluid or exudations of asphaltum at points on the surface. In many instances, however, no indications of petroleum have been seen until it was met with in the bore, and this has sometimes been appealed to as a warrant for blind stabbing with the drill on the off-chance of striking oil in country which has taken the prospector's or promoter's fancy!

It is on record that "in nearly every case where oils have been discovered in the United States or other countries, the discovering has been directed by a seepage of oil or gas. The most usual places for exudations of oil are in stream beds, in ravines and low ground generally, or at out-cropping joints on the slopes of rockfolds." Frequently the surface soil will have to be removed before any actual signs of seepage can be seen. Outcrops may have a bituminous appearance, but, if exhausted and much unearthed, they may not be recognisable at the first glance as oil rock. In such cases a faint odour and with limestones, sometimes sulphur stains, are all the indications available.

In Tasmania, so far, no undoubted surface seepages of petroleum are known to the Mines Department, although unquestionable petroleum residues are present as loose fragments of asphaltum on various beaches of the Tasmanian coasts. These fragments are usually found near high-water mark between normal and storm-tide levels, but no pieces have been found up the streams. They vary in weight from an ounce or two to nearly a hundredweight, and are of no particular shape, being mere fragments. The substance is sometimes plastic, and fresh-looking pieces frequently have an odour similar to that of naptha. Fresh surfaces show the lustre of pitch. The specific gravity of this asphaltum has been determined in the geological survey laboratory as ranging from 1.0313 to 1.0459. Consequently, though it might not float in stationary sea-water, it would do so in moving water. The finding of this fragmentary asphaltum has a direct bearing on the presence of petroleum, for it will be remembered that alberite, a kindred or practically identical mineral—that is to say an inspissated petroleum—occurs in New Brunswick in vein form.

Investigations for evidence that petroleum is to be found in the region have been made at Kongarong, South Australia, but without results, although coorongite has been picked up on the crests of the oil consolidated sand-dunes in the vicinity, and this substance has been assumed by some people to be a petroleum product, although, strictly speaking, its relationship to petroleum cannot be said to be established.

Fuel oil is perhaps the wealthiest industrial asset in any nation, and although no field yielding native oil as an economic proposition has yet been discovered within the territory of Australia, strong efforts must continue to be put forward to discover the oil fields which no doubt exist somewhere in the great heart of our Commonwealth.—"Land and Transport," Melbourne.

ALCOHOL FROM SUGAR CANE TOPS.

Inquiries having been made as to the practicability of profitably manufacturing alcohol for power purposes from cane tops, "Science and Industry," the official Journal of the Commonwealth Institute of Science and Industry, gives the following notes on the subject:—"As a matter of fact, the sugar content of cane varies very much, equally in the stems as in the tops. The amount will also depend on where the tops are cut off, whether they are to be left on the field to be ploughed in, or taken to feed stock. If the trashing has been done some time before cutting, the green cane under the leaves ripens, and the cut is made just *above* the base of the last leaf. The percentage of hydrolizable sugars might be taken as 2.6 per cent. If a little more of the stalk is taken when cutting off the top—*i.e., below* the last leaf, the percentage might rise to 4.6 per cent., or 5.9 per cent., as a maximum. The moisture would be about 70 per cent.

One ton of cane tops should produce from 3.63 to 8.24 gallons absolute. Thus, from a ton of cane tops we might reckon on an average, say if 4 gallons absolute alcohol, but varying up to, say, 7 gallons, depending on place of cutting off tops, ripeness of top, and variety of cane, &c. It is not very safe to generalise too much for calculation and it is better to be on the conservative side and calculate on a rate of 4 to 5 gallons.

General Notes.

LICE AND MANGE INFECTION OF PIGS.

By T. H. WILLIAMS, Chief Inspector of Stock, South Australia.

MANGE.

Authorities say the pig is liable to one variety of mange only—viz., that arising as the result of the presence of the *Sarcoptes scabiei suis*, the mange mite which burrows under the skin of its victim. Severe irritation is set up, and is followed by the formation of thick masses of scabs and scales. Accumulations of filthy, rough, and splintered surfaces of decaying timber, rough bark on pepper and pine trees, and boxthorn, together with dirty sties favour the harbouring of the mange mite. The disease is usually more common in young pigs. Immediately after weaning the attacks occur in the most severe form, when they are shut in dirty, infected sties. The first lesions are noticeable about the head, back, behind the ears, &c. As the itching caused by the burrowing mites increases, bran-like dry scales pile up forming crust-like masses. The skin hardens into thickened folds along the back. Severe itching and the presence of scales and scabs makes the diagnosis clear. The mites can only be seen by the aid of a microscope.

Treatment.—Thoroughly scrub infected animals with softsoap and water, then rub in lard and sulphur. Badly infected pigs will need treating several times. Many young pigs have died of weakness and secondary infection due to mange.

The hog louse (*Haematopinus suis*) is the largest of animal lice, and is erroneously referred to by the majority of pig-keepers as a tick. The female louse deposits large numbers of eggs, or nits, which may be seen by the unaided eye, attached to the hair. They are yellowish-white in colour, and are deposited behind the ears, on the back, shoulders, &c. Adult lice and eggs are easily seen, and are common where pigs are kept in dirty, neglected surroundings. Young pigs infected with lice become unthrifty. Recent investigations have proved that the hog louse conveys into the system of young pigs a virus which kills off whole litters. Like the human louse, which caused trench fever, so the animal louse sets up a fever. In America this louse has been held responsible for spreading swine fever, and in the light of recent history it has probably caused the disease among pigs in this State.

Treatment.—The destruction of the pig louse is an easy matter, but the nits, being covered by a tough gelatine cover, are not readily destroyed. The application advised for the mange mite, with the addition of kerosene to the lard or mutton fat and sulphur, will be effective, or if the owner can afford to construct a dip, pigs may be dipped in any of the carbolic dipping preparations.

THE LEGAL SIDE OF THE QUESTION.

As mange and lice are now proclaimed diseases under the "Stock Diseases Act of 1888," owners, managers, or agents are liable to a penalty of from £5 to £100 if they travel infected pigs on public roads or in railway trucks, or expose them for sale in any markets, whether public or private. When pigs are found infected with mange or lice, the owner may be required by notice served on him or his agent or servant to treat the diseased pigs and disinfect sties, yard, shelters, &c. It now becomes the duty of every one about to buy pigs to see that mange and lice parasites are not included in the deal, whether private or at the sale yards. Pig owners must now be seized of the fact that lice and mange of pigs is a notifiable disease. In South Australia, any persons failing to notify the Chief Inspector of Stock render themselves liable to a penalty of £20.—"Journal of Agriculture," South Australia.

MORTALITY AMONG HORSES.

At the present time on the Downs, and more particularly around Toowoomba (says the "Chronicle"), there is flourishing what is known as the "Bee Nettle," or otherwise the "Stagger Weed." It resembles somewhat the ordinary stinging nettle, but is minus any prickles, while it is of a golden hue. Owing to the dry weather and scarcity of grass, the pest, which is apparently a drought resister, is flourishing, and the stock eat it. The consequences have been most serious, and the position has become so acute that the Stock Department will probably move in the matter. The high mortality among horses, and the mysterious cause of their death, has led to a number of complaints, so much so, that in one instance a post-mortem examination was held, and it was then found that the cause of death was due to the animal eating this noxious weed.

ST. JOHN'S WORT PARASITE.

DISCREDITED IN ENGLAND.

Some time ago the Bureau of Science and Industry decided, at the instigation of Professor Lefroy, to introduce from England the Chrysomela beetle, which was reported to be a destructive parasite of the St. John's Wort weed.

The objections raised to the introduction of what might in turn prove to be another pest were met by the undertaking of the bureau to conduct experiments with safeguards against the escape of the parasites.

Another light is thrown upon this Chrysomela by Professor Newstead, of Liverpool University, who, in a private letter, says: "I have never seen the St. John's Wort beetle in life, although it has been one of my special desiderata for the last three decades. It is said to occur in the Liverpool district, but I can never find it. The food plant grows freely in some places, but it is by no means a common weed. Very little is known of the binomics of the Chrysomela in question. In my long experience I have never seen St. John's Wort suffering from the attacks of any insect.

"The Imperial Bureau of Entomology had the subject of Chrysomela before it at the last meeting, when a sub-committee was formed to deal with the matter. We (the sub-committee) met on 4th June, and from what we have said in our report I doubt if Australia will ever trouble to introduce the Chrysomela."

TO TAN A HIDE.

The first operation to which hides are subjected is depilation—that is, removing the hair and the scarf skin. This is done in various ways. The most common plan is to throw the hide or skin into a strong watery "ley" of slaked lime with lime in excess. By this, in a few days, the hair is easily detached. In America this sweating is performed cold, and the hides are hung up wet in a damp cellar, and are kept moist for ten days or a fortnight. By this a sort of mild putrefaction takes place, when hair and scarf skin are easily removed. One hundred pounds of hides will take 300 lb. of wattle bark, yielding 40 lb. to 50 lb. of leather.

A single hide may be taken from the lime water and folded up wet. The ground bark is placed in water, and may be at first a weak solution, and finishing up with a strong one. From the weak to the strong solution takes about six weeks. The final process is to fold up the hide, putting in thin layers of tanning bark, leaving it in this state for six weeks more, when the hide will be found converted into leather. In tanneries the whole process takes about a year.

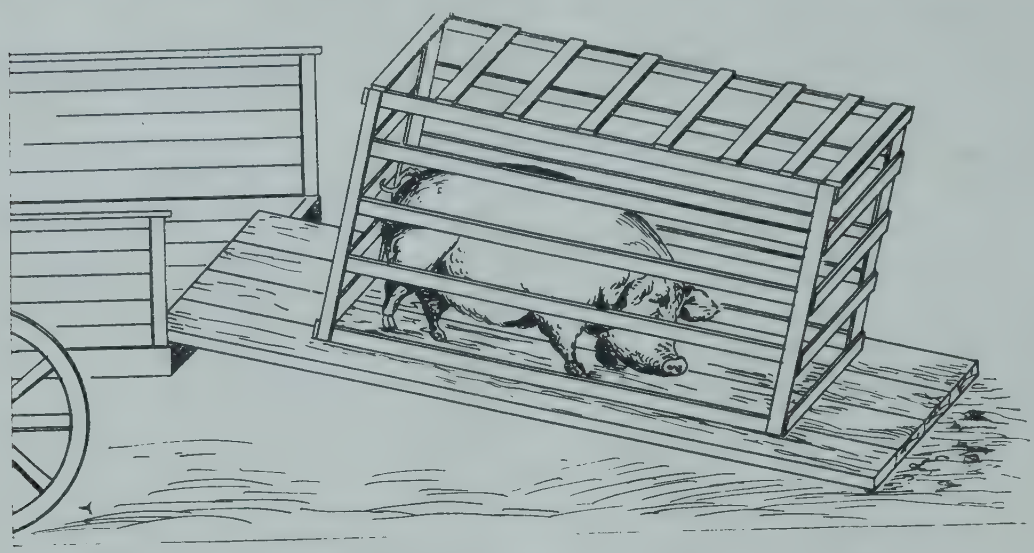
A quick method of tanning skins is the following:—Pour 5 or 6 quarts of boiling water over 2 quarts of bran, and strain the infusion. Make an equal quantity of salt water, using as much salt as will dissolve. Mix the bran and salt water, and to each gallon of the mixture (when only lukewarm) add 1 oz. of sulphuric acid. Immerse the skin in the liquor, stirring occasionally till tanned in about twenty minutes. Then rinse in clean water and hang up to dry. The leather will be white. This applies more to wallaby, rabbit, and other such skins than to heavy hides.

RED POLLS AS DUAL PURPOSE CATTLE.

The dual purpose characteristics of the Red Poll breed were demonstrated recently in England in some figures as to milk yields and weights of stock sold for beef. The twenty-three cows in the Norfolk herd of the late Mr. John Hill, of Gressenhall, have averaged for the twelve months from 1st July, 1918, to 1st July, 1919, an average yield of 8,731 lb., the figures for the leading ten being:—Gressenhall Pearl, 13,459½ lb.; Peggoty, 11,627¼ lb.; Roseanna, 11,130 lb.; Red Star II., 11,179¾ lb.; Molly, 10,211 lb.; Red Berry, 10,159¾ lb.; Strawberry V., 9,981¼ lb.; Tottie, 9,400 lb.; Southgate VI., 9,368 lb.; Rosanna, 9,299 lb. The value of Red Polls on the fat stock market was illustrated in connection with the sale of the five-year-old bull, Sudbourne King Crow, belonging to the Earl of Derby. This bull, bred from milking strains, was sold at the auction mart at Newmarket on 13th May of this year for £86 5s. 8d., and he scaled within a few pounds of a ton. No attempt had been made to fatten him, and up to the day of the sale he had been running with the cows. Another Red Poll bull, recently sold on the fat stock market at Framlingham, scaled 18 cwt., and being super-graded, realised £87 16s.

LOADING PIGS.

An American farmer, says the "South African Farmers' Advocate," loads his pigs into a wagon or truck by means of a floorless crate. Two planks, 10 ft. to 12 ft. long, make a gangway; the crate is placed over the pig, and he is made to walk backwards as shown in the illustration, up the planks. As the crate touches his nose,



he will back up the planks and into the wagon. The crate can then be fastened down with a rope. The planks can be laid from the wagon to the railway truck, and the pig loaded in the same way. The slats of the crate must be close together.

Answers to Correspondents.

TO BANISH BUGS.

In reply to a correspondent who wishes to know of an effective means of destroying bugs in a home, the Agricultural Chemist (Mr. J. C. Brünnich) advises as follows:—

"The only absolute cure is the use of hydro-cyanic acid gas, with which the rooms have to be fumigated. One treatment is generally sufficient, as both bugs and all eggs are killed, providing the rooms can be made to hold the gas for some time.

"As the gas is highly poisonous, it is best to get a person used to such work to do the fumigation; but, if care be taken, the operation can be done by anyone.

"For every 1,000 ft. of cubic space, use 9 oz. of cyanide, 12 fluid ounces of strong sulphuric acid, and $1\frac{1}{2}$ pints of water.

"The gas should be generated in earthenware vessels or in water-tight wooden boxes. Fumigate on a calm day. Make all the rooms as gas-tight as possible, closing all cracks and openings, which is easily done by pasting paper on the outside over the openings. A door or window should be so arranged as to be opened from the outside, to allow the gas to escape after fumigation is finished.

"Pour the water first into the earthenware vessel. Then add the sulphuric acid slowly and very cautiously, and, finally, the cyanide (previously broken into lumps of about half an ounce in weight) is thrown into the vessel. The weighed-out quantity of cyanide may be wrapped in a piece of paper, and the whole thrown in at once. As the gas is immediately given off, the operator must take care not to breathe when adding the cyanide, and leave the room at once. Let the gas act as long as possible—at least twelve hours. Then open all the rooms, and allow not less than an hour's interval before anyone is permitted to enter the rooms. No room should be entered as long as the peach-like odour of the poisonous gas is very pronounced."

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER, 1919, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1919 AND 1918, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1919.	Sept., 1918.
North Coast.	In.		In.	In.
Atherton	0·59	18	0·83	Nil
Cairns	1·69	37	1·56	0·89
Cardwell	1·44	47	1·03	0·81
Cooktown	0·57	43	0·47	0·62
Herberton	0·47	32	0·92	0·08
Ingham	1·06	27	0·95	0·45
Innisfail	3·61	38	2·86	2·65
Mossman	1·01	11	2·01	0·31
Townsville	0·77	48	0·11	0·19
Central Coast.				
Ayr	1·64	32	0·05	0·19
Bowen	0·84	48	0·03	0·69
Charters Towers ...	0·82	37	0·04	0·50
Mackay	1·52	48	0·18	0·53
Proserpine	2·07	16	0·12	0·37
St. Lawrence ...	1·36	48	0·07	0·61
South Coast.				
Biggenden	1·76	20	0·02	0·29
Bundaberg	1·89	36	Nil	0·47
Brisbane	2·06	68	0·19	1·98
Childers	2·07	24	Nil	0·82
Crohamhurst ...	2·53	25	0·33	3·45
Esk	2·38	32	0·23	0·73
Gayndah	1·61	48	0·06	0·26
Gympie	2·19	49	0·05	2·95
Glasshouse M'tains	2·19	11	0·15	1·55
Kilkivan	1·78	40	Nil	0·07
Maryborough ...	2·01	48	Nil	1·75

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1919.	epSt., 1918.
South Coast—continued:	In.		In.	In.
Nambour	2·58	23	0·15	3·46
Nanango	1·99	37	0·29	1·30
Rockhampton ...	1·37	32	0·03	0·38
Woodford	2·20	32	0·18	0·98
Darling Downs.				
Dalby	1·82	49	0·15	0·60
Emu Vale	1·98	23	0·12	Nil
Jimbour	1·71	31	Nil	0·38
Miles	1·50	34	0·03	0·38
Stanthorpe ...	2·51	46	0·18	0·33
Toowoomba ...	2·28	47	0·41	0·50
Warwick	1·97	32	0·16	0·05
Maranoa.				
Roma	1·62	45	Nil	0·24
State Farms, &c.				
Bungeworgorai ...	1·87	5	Nil	Nil
Gatton College ...	1·80	20	0·12	0·52
Gindie	0·95	19	Nil	0·51
Hermitage ...	1·73	13	0·12	Nil
Kairi	0·87	5	0·91	0·08
Sugar Experiment Station, Mackay	1·39	22	0·08	0·46
Warren	0·97	5	Nil	0·55

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year, and for the same period of 1918, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

SOCIETIES, SHOW DATES, ETC.

HERBERT RIVER.—Ripple Creek Farmers' Association. Secretary: Geo. Geeson.

HERBERT RIVER.—Macknade Farmers' Association. Secretary: Geo. Geeson.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER, 1919.

Article.		OCTOBER. Prices.
Bacon	lb.	11½d.
Barley	bush.	5s. 3d.
Bran	ton	£8 15s.
Broom Millet	"	£20 to £25
Broom Millet (Sydney)	"	£65
Butter (First Grade)	cwt.	188s. 4d.
Chaff, Canary Straw	ton	...
Chaff, Lucerne	"	£14 to £25 10s.
Chaff, Mixed	"	£13 to £17
Chaff, Oaten	"	£13 5s. to £18
Chaff, Wheaten	"	£11 10s. to £17
Cheese	lb.	11d.
Flour	ton	£14
Hams	lb.	1s. 3d. to 1s. 10d.
Hay, Lucerne	ton	£17 to £19
Hay, Oaten	"	£13 15s.
Hay, Wheaten	"	£8 to £10 10s.
Honey	lb.	5½d. to 6½d.
Maize	bush.	7s. 5d. to 8s. 3d.
Oats	"	8s.
Onions	ton	£15 15s. to £16 15s.
Peanuts	lb.	6½d. to 8d.
Pollard	ton	£9 5s. to £10 5s.
Potatoes	"	£22 to £32 10s.
Potatoes (Sweet)	..	6s. to 12s. 6d.
Pumpkins (Cattle)	ton	£2 11s. 6d. to £10 10s.
Sugarcane	"	£2 5s.
Turnips (Swede)	cwt.	7s. 9d. to 9s.
Eggs	doz.	11½d. to 1s. 3d.
Fowls	per pair	4s. 9d to 10s. 2d.
Ducks, English	"	3s. 9d. to 5s. 6d.
Ducks, Muscovy	"	5s. 6d. to 9s. 7d.
Geese	"	6s. to 8s.
Turkeys (Hens)	"	16s. to 17s.
Turkeys (Gobblers)	"	34s. to 60s.
Wheat (Milling)	bush.	5s. 3d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per doz. bundles	7s. to 17s. 6d.
Beans, per sugar-bag	8s. to 22s.
Beetroot, per dozen bunches	1s. to 1s. 6d.
Cabbages, per dozen	12s. to 23s.
Carrots, per dozen bunches	9d. to 1s.
Cauliflowers, per dozen	...
Celery, per bundle	2s. 6d. to 2s. 9d.
Lettuce, per dozen	6d. to 1s.
Marrows, per dozen	2s. to 4s. 6d.
Peas, per sugar-bag	9s. to 21s.
Potatoes (Sweet), per cwt.	6s. to 7s. 6s.
Pumpkins (table), per cwt.	3s. 9d. to 10s.
Tomatoes, per quarter-case	5s. 6d. to 15s. 6d.
Turnips, per doz. bunches	3s. to 4s.
Turnips (Swede), per sugar-bag	1s. 6d. to 3s. 9d.

SOUTHERN FRUIT MARKETS.

Article.	OCTOBER. Prices.
Bananas (Queensland), per case	25s. to 30s.
Bananas (Tweed River), per case	25s. to 30s.
Bananas (Fiji), per case	20s. to 30s.
Lemons, per bushel-case	10s. to 12s. 6d.
Mandarins, per case	16s. to 20s.
Oranges, per bushel-case	12s. to 15s.
Oranges (Navel) per bushel-case	14s. to 18s.
Passion Fruit, per double-case	15s. to 25s.
Pineapples (Queens), per double-case	12s. to 20s.
Pineapples (Ripleys), per double-case	15s. to 17s.
Pineapples (Common), per double-case	15s. to 17s.
Strawberries (Queensland), per tray	10s. to 24s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel-case	14s. to 24s.
Apples, Cooking, per bushel-case	10s. to 15s.
Bananas (Cavendish), per dozen	4½d. to 10d.
Bananas (Sugar), per dozen	3d. to 8d.
Cape Gooseberries, per quart	10d. to 1s. 2d.
Citrons, per cwt.	10s. to 11s.
Cocoanuts, per sack	15s. to 25s.
Custard Apples, per quarter-case	8s. to 15s.
Lemons (Lisbon), per half-case	8s. to 14s.
Lemons (Rough), per cwt.	13s.
Mandarins, per case	10s. to 19s.
Mangoes, per case	15s. to 18s.
Oranges (Seville), per cwt.	18s.
Oranges (Navel), per cwt.	14s. to 18s.
Oranges (Other), per cwt.	12s. to 22s.
Papaw Apples, per quarter-case	4s. to 12s. 6d.
Passion Fruit, per half-bushel case	9s. to 17s. 6d.
Pears, per case	14s. to 17s. 6d.
Pineapples (Rough), per dozen	4s. to 11s. 6d.
Pineapples (Smooth), per case	10s. to 15s.
Pineapples (Ripley), per dozen	9s. to 14s. 3d.
Rosellas, per sugar-bag	...
Strawberries, per dozen boxes	6s. to 25s. 6d.
Tomatoes (prime), per quarter-case	12s. to 15s. 6d.
Tomatoes (inferior), per quarter-case	3s. to 6s.

TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1919.

Animal.	SEPTEMBER. Prices.
Bullocks	£22 10s. to £30 10s.
Cows	£16 12s. 6d. to £19.
Merino Wethers	53s.
Crossbred Wethers	47s. 6d.
Merino Ewes	43s. 3d.
Crossbred Ewes	38s.
Lambs	43s. 3d.
Pigs (Porkers)	81s.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	September.		October.		November.		December.	
Date.	Rises	Sets.	Rises	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·30	5·47	4·59	6·4	4·46	6·27
2	6·2	5·34	5·29	5·48	4·59	6·5	4·46	6·28
3	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·29
4	6·0	5·35	5·27	5·49	4·57	6·7	4·46	6·30
5	5·59	5·35	5·26	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·25	5·50	4·55	6·8	4·46	6·32
7	5·57	5·36	5·24	5·50	4·55	6·9	4·46	6·32
8	5·56	5·37	5·23	5·51	4·54	6·9	4·46	6·33
9	5·55	5·37	5·22	5·51	4·53	6·10	4·47	6·33
10	5·54	5·38	5·21	5·52	4·53	6·11	4·47	6·34
11	5·53	5·38	5·19	5·52	4·52	6·11	4·47	6·35
12	5·51	5·38	5·18	5·53	4·52	6·12	4·47	6·36
13	5·50	5·38	5·17	5·53	4·52	6·13	4·47	6·36
14	5·49	5·39	5·16	5·54	4·51	6·14	4·48	6·37
15	5·48	5·39	5·15	5·54	4·51	6·14	4·48	6·37
16	5·47	5·40	5·14	5·55	4·51	6·15	4·48	6·38
17	5·46	5·40	5·13	5·55	4·50	6·15	4·49	6·38
18	5·45	5·41	5·12	5·56	4·50	6·16	4·49	6·39
19	5·44	5·41	5·11	5·56	4·49	6·17	4·49	6·39
20	5·43	5·42	5·10	5·57	4·49	6·18	4·50	6·40
21	5·41	5·42	5·9	5·57	4·48	6·19	4·50	6·40
22	5·40	5·43	5·8	5·58	4·48	6·20	4·51	6·41
23	5·39	5·43	5·7	5·58	4·47	6·21	4·51	6·41
24	5·38	5·44	5·6	5·59	4·47	6·22	4·52	6·42
25	5·37	5·44	5·5	5·59	4·47	6·23	4·52	6·42
26	5·35	5·45	5·4	6·0	4·47	6·24	4·53	6·43
27	5·34	5·45	5·3	6·1	4·46	6·25	4·53	6·43
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·31	5·47	5·0	6·3	4·46	6·27	4·55	6·45
31	...	...	5·0	6·4	...	...	4·56	6·45

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania, unless "summer time" is adopted.

			H. M.
3 Sept.	☾	First Quarter	12 22 a.m.
10 „	○	Full Moon	1 54 p.m.
17 „	☽	Last Quarter	7 32 a.m.
24 „	●	New Moon	2 34 p.m.

The Moon will be in Perigee on 13th at 6·6 p.m., and in Apogee on the 29th at 3·30 p.m.

2 Oct.	☾	First Quarter	6 37 p.m.
9 „	○	Full Moon	11 39 p.m.
16 „	☽	Last Quarter	3 5 p.m.
24 „	●	New Moon	6 40 a.m.

The Moon will be in Perigee on 11th at 2·54 p.m., and in Apogee on the 27th at 6·42 a.m.

1 Nov.	☾	First Quarter	11 43 a.m.
8 „	○	Full Moon	8 35 a.m.
15 „	☽	Last Quarter	1 41 a.m.
23 „	●	New Moon	1 20 a.m.

The Moon will be in Perigee on 8th at 11·54 p.m., and in Apogee on the 23rd at 12·24 p.m.

1 Dec.	☾	First Quarter	2 47 a.m.
7 „	○	Full Moon	8 4 p.m.
14 „	☽	Last Quarter	4 2 p.m.
22 „	●	New Moon	8 55 p.m.
30 „	☾	First Quarter	3 25 p.m.

The Moon will be in Perigee on 7th at 12·48 p.m., and in Apogee on the 20th at 1·36 p.m.

The Moon will cause an annular eclipse of the Sun on Nov. 23rd, but it will not be visible in Australia. There will also be a partial eclipse of the Moon on Nov. 8th which will be visible in England but not in Australia.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets and the moonlight then extends all through the night, when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

Orchard Notes for December.

THE SOUTHERN COAST DISTRICTS.

December is somewhat an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry, see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kinds of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting out of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

THE TROPICAL COAST DISTRICTS.

Clean up all orchards and pineapple and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe Northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leaf varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish dumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry, keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit-fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grapes once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

Farm and Garden Notes for December.

Too much care can scarcely be bestowed upon potatoes dug up this month to protect them from the sun. They should be dug or ploughed out as soon as the skin is firm, as they are liable to rot in the ground owing to the great heat.

FIELD.—The wheat harvest will be now nearing completion. The estimates of the probable yield have varied so considerably that it will be well to wait until the entire harvest is over before speculating on the result. This State is a long way from becoming a wheat-exporting country. The principal factor operating against a still greater extension of the wheatgrowing industry is that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

Given favourable weather, maize, panicum, imphee, kafir corn, and the various millets may be sown.

Cotton sown in October and November will be making headway but slowly, owing to the lack of September and October rains. Keep down all weed growth by scarifying as long as the growth will admit of horse work. Tree cottons, such as Sea Island and Caravonica, should be topped and pruned.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Sow cabbage and cauliflower seed. Great difficulty will be experienced in getting these to grow at this season, and the plants will consequently be more valuable in proportion. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

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Agriculture.

AGRICULTURE: WHAT IT MEANS TO OUR CITIES.

On 28th October. Mr. Cuthbert Potts, Principal of the Queensland Agricultural College. Gatton, delivered a lecture in the Albert Hall, under the auspices of the Brisbane Chamber of Commerce, on the above text.

The importance of agriculture to the State, its country population, and its cities, warrants us in devoting space to the full text of Mr. Potts's lecture, which reads as follows:—

When a large area of new country is undergoing development, the process is much as follows:—Small isolated areas are selected and settled and become known. The intervening spaces, with all their possibilities, remain unrecognised. Then comes a time when someone, knowing all the separated areas, suddenly gets a breadth of view, and this man realises that all these isolated areas might be linked together, converting the lot into a district, for the betterment and advancement of each and every part. Perhaps this vision came merely because some high hill or mountain was climbed and the whole land suddenly came under observation. Perhaps the conception was due to some other chance event which caused man to stop and think, to look outward, and to collate his knowledge. But whatever the cause, this remains: If someone has visualised great possibilities, and his vision is true, others quickly realise the situation. The idea spreads, it gathers weight, and the necessity to take action becomes imperative. Then follows a period of exploration, survey, and mapping. Carefully conceived lines of communication are built, new areas are developed, and the result is a united district.

I think this process of development is applicable to all big problems of human affairs. In particular it is applicable to our outlook on Agriculture. So, if to-day I can show you a wide and extended view of

agriculture in its relations to our cities—a view of the whole situation as if you were looking out from the top of a high mountain—then I am sure you will not be satisfied until the work of "exploration, survey, and mapping" has been proceeded with, and the necessary lines of linkage have become accomplished facts.

The problem before us to-day is *Agriculture and what it means to our Cities,* and the chance event which has brought this matter urgently before us is the war, or, rather, the necessity for reconstruction and development following the war. We have arrived at a time when we must "stop and think, and look outward and collate our knowledge" in regard to this matter.

AGRICULTURE IS OUR BIGGEST INDUSTRY.

To prevent any misunderstanding, it is necessary to state that the term agriculture is used throughout this address in its widest sense, so as to embrace all production from the land, whether pastoral, grazing, or farming. With this definition let us examine what part agriculture plays in the production of Australia's annual national wealth. This is well illustrated by a consideration of the statistical figures showing the average annual production from industry for the five-year period immediately prior to the war.

Average Annual Production from Industry—1909-1913.

			Percentages.	
Agricultural Production—				
(Agriculture) farming ..	£42,300,000		21·7	
Pastoral	53,613,000		27·5	
Dairy, poultry, bees ..	18,436,000		9·5	
	————	£114,349,000	——	58·7
Forestry and fishing ..	5,550,000		2·8	
Mining	24,234,000		12·4	
Manufacturing ..	50,937,000		26·1	
	————	80,721,000	——	41·3

Thus, in the normal time immediately preceding the war, agricultural production was responsible for practically 60 per cent. of our Australian annual income. If we consider Queensland only, this percentage is probably much higher.

OUR CITIES ARE DEPENDENT ON AGRICULTURAL PRODUCTION.

In making this statement, there is no desire to deny that our cities are absolutely essential for the successful development of our agriculture. But granting this as an important fact, we have still to face the problem—what is the relative position of cities and agriculture? A small examination shows that the cities are dependent on it. Consider for one moment what would be the effect if the produce from the land were completely cut off from the city, even for a week. There would be no milk, no bread, no meat, no butter or jam, or clothing, &c. Think of the human suffering that would result; but think further of your trams, your picture shows, your many activities which constitute civilian life. They would all cease. But let us reverse the problem. Suppose the

cities were suddenly obliterated, what would be the effect on agriculture? Agriculture would receive a set-back, but it would not be annihilated. Agriculture could and would continue to exist without our cities, though the stage of civilisation would be low.

Absurd as this problem seems, it is of importance, because it enables us to get a better conception of the true relations between our cities and our agriculture. Thus, if our cities vanished—ceased to exist—agriculture with a low type of civilisation would remain. Starting from this basis—that is, no cities, and only agriculture—let us see what would result. If agriculture develops, cities become not only possible but they become necessary. Time prevents me from giving the mathematical argument beyond this. Suffice it to say that if we go back, the cities fail more rapidly than agriculture. If we go forward, the cities develop in a greater ratio than the development of agriculture. To put the matter crudely—If our present agricultural production were permanently reduced to one-half, our cities would degrade by more than 50 per cent.; but if our agricultural production were doubled, then our city development would be more than 100 per cent.

To a great extent, the argument given above applies to our manufactures, and it would apply absolutely if our manufacturing were developed up to the full extent of our primary production. Unlike Great Britain, Australia is not an importer of raw goods. Such raw goods as we handle are home-grown. Hence manufacturing in Australia is dependent on our agriculture.

WHAT AFFECTS AGRICULTURE IMMEDIATELY AFFECTS OUR CITIES.

From what has been said above, we can see how intimately the prosperity of our cities is bound up with the prosperity of our agriculture. This applies to Australia in particular, because, as shown, about 60 per cent. of our annual national wealth is derived directly from the land. If we have a number of good years during which agriculture prospers, then our cities prosper, but in greater ratio. Should a drought occur, or should there be a succession of adverse seasons reducing production by, say, 20 per cent., then the cities suffer, but by more than 20 per cent. How vastly important, then, for the cities to see that agriculture is prosperous, progressive, and stable.

This brings us back to the war. In view of what has been said before, we have to ask ourselves a very pertinent question. Has our agriculture advanced during the war period, or has it gone back? If it has advanced, we can face the future with confidence, but if it has gone back, then the outlook is serious, and requires our immediate and whole-hearted attention.

Let us examine the war period. The year 1915 was a drought-year. Again, in 1918, drought visited the country, and this drought is still with us. If there were no other circumstances to take into consideration, we could confidently assume that our agriculture had received a set-back, and that the consequent set-back to our cities would result. But there is one big disturbing factor—the war. Has this prevented the droughts from having their usual effect, or have the effects been intensified? Perhaps we can get some information by examining the statistical figures for 1917.

Production from Industry—1917.

			Percentages.	
Agricultural Production—				
(Agriculture) farming ..	£57,967,000		20·4	
Pastoral	93,414,000		32·7	
Dairy, poultry, bees ..	31,626,000		11·3	
	————	£183,007,000	——	64·4
Forestry and fishing ..	5,600,000		1·9	
Mining	25,591,000		9·1	
Manufacturing ..	70,000,000		24·6	
	————	101,191,000	——	35·6

The figures for forestry, fishing, and manufacturing are not complete, and have been estimated.

Glancing at the percentages shown in this table, it would seem that agriculture has increased in importance with regard to the production of our annual national wealth. This may be so, but it is not what we are searching for. What we want to know is, whether agricultural production has actually increased or not. Comparing the two statistical tables, here given, the value of agricultural products for 1917 shows a presumable increase of nearly £70,000,000. But these figures, satisfactory as they appear, cannot be taken as they stand. The pound sterling of 1917 has not the same value as the pound sterling of 1909-13. The depreciation in the value of the sovereign is probably about 33 per cent., and if this is taken into consideration, agricultural production shows no substantial increase. But again:—The year 1917 was a comparatively good year, and the preceding year was also good. We had a drought in 1915, and drought conditions again appeared in 1918 and are still with us. If we had the complete figures for the five-year period 1914-19, it is very doubtful if we could show any increase of agricultural production. In fact, there is strong collateral evidence indicating that the actual production from the land has decreased and not increased during the war period. If this deduction is correct, the matter is serious, for eventually our cities must suffer. I know you can say they are not suffering now. In fact, they seem to be very prosperous. You can also claim that business is very brisk. But we have to remember that normal financial reactions have been blinded—camouflaged—by the necessary expenditure of large amounts of loan money during the war.

THE GREATER NUMBER OF OUR PEOPLE LIVE IN THE CITIES.

In Australia there are probably five or six town workers for each worker on the land. This is as it should be in a highly civilised country. There is no desire to lower this ratio, rather we may hope that the ratio may be increased. But if this ratio is increased and a still greater proportion of our people live in the cities, this will in no way detract from the importance of agriculture to the community. All it will mean is, that the man on the land has become more proficient, and in consequence it is possible to release a greater number to carry out important wealth-producing functions of a higher civilisation. As our cities become relatively more populous, the situation will become more delicate, for, as we have pointed out above, our cities are dependent on agriculture. So in the future, more so than at present, we must expect to find the majority of our people dependent on the success of a few, viz., our agricultural community.

How important, then, for the cities to take every precaution to ensure that agriculture is prosperous.

From the above it must not be assumed that Australia, and particularly Queensland, is in a state of development at the present time which would justify us in stimulating a migration from the country to our cities. Probably, at the immediate moment, a migration from cities to country is more essential. But, whatever the demands of the present, the fact remains that a higher civilisation requires a higher ratio of town workers, but it must not be forgotten that this state of affairs is only stable provided the agriculture of the country is both prosperous and highly efficient.

NUMBERS COUNT IN DETERMINING THE POLICY FOR A COUNTRY.

So far, an endeavour has been made to indicate how intimately the prosperity of our cities is dependent on the prosperity of our agriculture. Further, an attempt has been made to emphasise the urgency of the present situation because of the necessity for reconstruction, also because of the drought, but mainly, because it is almost certain that our production from the land has decreased during the war period. Strange as it may seem, this problem is mainly the concern of the cities. They control the situation. The cities have the numbers, and numbers count in determining the policy of a country. It lies, then, in the hands of our cities to make our agriculture stable and prosperous. I am afraid, however, that the general city attitude has been one of neglect of or indifference to agriculture. Agriculture has been looked on as a fair field for exploitation rather than as our biggest industry, requiring sympathetic and intelligent assistance for development. This attitude of neglect may be natural, but it is obviously wrong and foolishly selfish. For "if you neglect your country, the grass will soon grow in the streets of your cities, but if your country prospers, the cities will leap ahead into prosperity."

WHAT ARE THE CITIES DOING FOR AGRICULTURE?

We have seen that the cities have much to gain from agriculture, but there is a reverse side to the problem. The cities have certain obligations to agriculture. Are these being honoured?

Let us examine one or two points. First, consider the general education system of the State. Examine it carefully, from our University down to the primary schools, and you will find that even the mention of agriculture is conspicuous by its absence. Where we find, as in rural schools, an attempt to handle the subject, we find it immediately isolated from the general school course. In other words, agriculture, our biggest industry, finds no place in our general education. The result is, that the majority of our citizens grow up *incapable of thinking in terms of our most important industry.* This in itself is bad, but even worse is the attitude towards agriculture which is unconsciously fostered. The very isolation of the industry with regard to our schools has a tendency to degrade it. Most of our boys and girls grow up with a contempt for agriculture, and we find this feeling embodied in the schoolmaster's so often given advice "to put the boy on the land, he is no good at school work."

With such schooling behind them, is it any wonder our cities fail to fully understand what agriculture means to them?

But there is a second point worth considering. This is the finance of agriculture. Every industry requires a legitimate and systematic system of credit if it is to thrive and progress. Have we organised such a system for agriculture? Perhaps the best way to illustrate this is to briefly describe what is taking place at the present time. The absurdity of the situation must appeal to you all.

We are in the grip of a drought. Ever since this began, the farmers have been obtaining credit from their local storekeepers. To begin with, this was just the ordinary convenience, but as the dry weather continued, the storekeeper has been compelled to give still more and extended credit. He cannot close on the farmer. That would be fatal. For in the middle of a drought, farm properties have lost value, and would be difficult to realise on. The only security is in futurity. The farmer has to be carried on. As a result the storekeepers must obtain credit from their wholesale houses. These, in turn, go to our banks and financial institutions. Thus in drought times the country compels the cities to make a loan under the most disastrous and least secure conditions.

Now follow what takes place when the drought breaks. The banks, being far removed from the farmer, and probably somewhat ignorant of actual conditions, ask for a reduction of the overdraft allowed to the big mercantile houses. These, in turn, apply to the country storekeepers, who are compelled to bring pressure on to the individual farmer. In order to meet his liabilities, the farmer is forced to sell his produce. But, with the breaking of the drought, everyone has produce: markets have collapsed, and may even be glutted.

In all conscience, is this sound finance? Yet this repeats itself with every recurring drought.

Just think of the number of stages in this compulsory and unsecured loan. Each party must charge an interest which will cover the risk, and the accumulation of the risk is passed on for the farmer to meet, while the conditions are so organised, or disorganised, that he is forced to sell his produce on a low market.

The pastoralist and grazier may be in a somewhat better position inasmuch as they deal more directly with the banks. Still, the conditions are somewhat similar. That agriculture does not prosper as it should is not surprising. Rather, the surprising fact is that agriculture can still progress in spite of this heavy impost.

This, briefly, is the existing system of finance for the agricultural industry. How unconsciously ignorant it is is illustrated by our city papers, which are filled, during droughts, with advice as to conserving fodder.

WHAT THE CITIES MUST DO.

Having gone this far, it seems necessary to offer certain suggestions as to ways and means for meeting the situation.

First, I would insist that such action be taken that agriculture would receive due consideration throughout our education system. Don't think by this, that the teaching of technical agriculture in all the schools is advocated. It is not. In fact, the place to teach technical agriculture is not the school, it is at a specially equipped college holding a position in the system somewhat midway between the secondary schools and the University. The place to teach the science of agriculture is

at our University, but *the place to teach something of the economic value of agriculture, something of its history of human achievement, something of its romance, is in the schools.* Above all things, such action should be taken as will completely eradicate that covert sneer at agriculture which is unconsciously bred in our present school training. Perhaps the best means of accomplishing this would be to establish a School of Agriculture at our University. Obviously, if agriculture is unrecognised at our University, we must expect the schools to neglect the subject. Against the establishment of a School of Agriculture at the University, it will probably be argued that such a school would not at present attract any students. But are we justified in judging the value by the number of immediate graduates it would turn out? I don't think so. The value of such a school must be judged by the influence it would have on our national welfare, and a moment's consideration will show that a School of Agriculture at our University would have enormous possibilities for good. It would immediately influence our school training. (It has been shown above how important and desirable this is.) Next, it would be the natural centre for the investigation of our many important agricultural problems such as prickly-pear eradication, cattle tick control, &c. But, over and above this, it would bring and hold the importance of agriculture before the public. In each and every way, this school would make for the prosperity of Queensland. It would assist the advancement of land production and so render possible still greater progress in the cities. If this School of Agriculture were established now, it would be to the advantage of everyone, but it would be more valuable to our cities than to our country.

Recently, Sir Samuel McCaughey made a handsome bequest to our University. The necessity for rapid and stable reconstruction is urgent. Agriculture in Queensland, in Australia, must play a predominant part in this matter of reconstruction. Would it not seem wise to use a part of the McCaughey bequest to establish a School of Agriculture at our University?

The second suggestion I would make is, that our cities should immediately devise a proper system of credit for agriculture. I have indicated above the type of credit which our droughts compel. This can and should be improved upon. Unfortunately, in good seasons agriculture is forgotten; it is remembered when the drought comes, probably because the city shoe begins to pinch. Then we find our city papers full of advice as to fodder conservation, &c. But the time to conserve fodder is when the seasons are good, and *this fodder would be conserved if it could be financed.* Could a boot manufacturer afford to make hundreds of thousands of boots and hold them against a possible shortage of leather, unless he could obtain a loan on his manufactured articles? Neither can most farmers afford to conserve large quantities of fodder against a possible drought unless such conserved fodder is recognised as security for a possible loan.

Just imagine what it would have been to the wealth and prosperity of Australia if we had met the present drought with 10,000,000 tons of conserved fodder. Not only would the famine prices at present obtaining in our markets have been avoided, but much of the live stock which have died, and are now dying, would have been saved.

I am speaking of fodder conservation because at present it is the most obvious problem. Perhaps ultimately it will be found to be the most important: for our live stock can only be protected and stabilised by

this means. Recently, as you have probably all noted, fodder conservation has been receiving important consideration in New South Wales, where the Minister for Lands is suggesting some method of co-operative action. But whether the action taken is co-operative or individualistic, the basis of success lies in legitimate and systematic finance.

Suppose a farmer put 500 tons of lucerne hay, say, in stacks, with the object of holding it so as to place it on the market in times of drought. This would mean that this farmer was prepared to lock up in stacks, roughly, £1,000 of capital, for it costs, approximately, £2 per ton to put lucerne into the stack, and £3 per ton to put it on the market. How many farmers have £1,000 of idle capital? Aggregate this over the whole country, and could the farming community be expected to finance the conservation of, say, 10,000,000 tons of fodder? Yet this conservation would pay, but it is only possible if it is financed, and the control of finance lies in the cities.

I quite realise the many difficulties to be faced in organising a legitimate scheme of credit for agriculture. They are many and important. But these few facts remain. Fodder conservation, as typified by the present drought, is good security, probably the best. Can it be made a safe security? This is the problem before our financiers. It can. Probably the main difficulty would be a proper statistical knowledge of the amount of fodder conserved at any given time compared with the amount in sight and the probable requirements. A statistical bureau giving this information accurately and frequently, and up-to-date, would be essential. Beyond this the banks could operate on what would ultimately become the safest security in Queensland.

That these statistics are of importance is indicated by consideration of what is a nearly annual operation on the part of several of our commercial firms and some individuals. Throughout the growing season, these parties gather information as to the prospects of some of the crops, *e.g.*, lucerne, maize, &c. If the prospects are good and a year's abundance in sight, they don't operate, but if there is a probable shortage, they do. They buy in the flush of the season at minimum prices, hold in storage till the period of annual shortage, and more often than not quit their goods at a good profit. This is quite a usual practice. The chances of success depend on the accuracy of the information, statistical information, gathered. Surely, if this unorganised system of records can render it possible for individuals who have had no risk in the growing of the stuff to make a profit, a properly organised scheme of crop statistics must render fodder conservation a safe security for direct operation between the farmers and the banks.

So far, we have only spoken of fodder, but, as stated above, this is not the only agricultural problem requiring and warranting a proper system of credit. An equally important but less obvious matter is stock unfortunately too few, who have been endeavouring to improve their stock improvement. Amongst all our live stock raisers there are a few—unfortunately too few—who have been endeavouring to improve their stock. These breeders are making not only for their own personal advancement, but they are also making—and in great measure—for the advancement of all stockmen, *i.e.*, for the advancement of agriculture in general. But, given a drought such as the present one, do those stock improvers receive prior financial assistance? or, given good seasons, do they receive extra financial encouragement? To both these questions the answer is, "Very little, if any." Here again we have a state

of affairs which is only possible because of the general ignorance of the essentials of agricultural economics. Stock improvement may benefit the individual. It will certainly improve agriculture as an industry, and, in consequence, is an important item making for the prosperity of our cities.

This is not the wild imagination of a visionary. This problem of legitimate finance for agriculture has been found a necessity in other countries. At present the banks of the United States of America are actively organising and establishing a system. Surely it would be to the advantage of Australia to do likewise. This matter of finance for agriculture is fundamental to our prosperity and our power of reconstruction following the war. The difficulties to be faced are many. But if the matter is tackled and set in operation, and studied statistically, I venture to predict that a generation would see the financing of Australian agriculture on as sound an actuarial basis as our life insurance.

SOME HINTS ON STACK ENSILAGE.

This method of making silage is, of course, preferable to making no provision whatever for a supply of fodder in a dry time. But pit ensilage is still better, and a strong, air-tight, round reinforced silo is better than any. Where, however, a man's means do not permit of his going to the expense of making silos in or above ground, then the stack silo may be resorted to, and if the stack is properly made there will not be much loss, and even what there is will be eaten by stock when little else is procurable. The stack system is undoubtedly the cheapest and simplest of any.

A stack may be erected in the paddock where the crop is grown, so that a great saving in cartage is secured. It is also easier to make sweet silage in stack form than by the use of rigid silos, and a stack has unlimited capacity—that is, it may be made of any size suitable to the quantity of fodder grown. There is also less waste in the larger stacks, owing to the fact that the larger the stack the less the exposed surface in proportion to the mass.

There are two kinds of silage—the sweet and the sour. It is the former that is the most suitable to make under the stack system. It is in controlling the result, or, in other words, the production of sweet or sour ensilage at will, that the whole art of ensilage exists. The result depends upon the temperature which the mass has been allowed to reach and the amount of pressure applied.

If, after carting the green material, heavy pressure is at once applied, the air is excluded, and the temperature of the mass is consequently kept at a low level. When, by this means, the temperature is prevented from rising above 120 degrees Fahr., sour silage results. On the other hand, for the production of sweet silage, the mass must not be weighted to any great extent before the temperature has reached from 130 to 150 degrees Fahr.

Care must be taken not to let the temperature rise above 160 degrees Fahr., or the stack will become over-heated and burst. The intelligent use of the thermometer is the chief factor in successful ensilage-making, and to the neglect of these few simple details the many failures may be attributed.

An ordinary floating dairy thermometer is the most convenient type to use, an iron pipe of a slightly larger diameter being built into the middle of the stack in a vertical position. The thermometer may then, at any time, be lowered by a string, and the temperature taken at any required depth. The best advice as to building an ensilage stack was given as follows some time ago by Mr. Conlon, then dairy expert, Tasmania:—In building the stack—which, for the sake of avoiding cartage, may be built on a level spot in the open field—on the spot chosen a thick layer of straw should be laid down as a foundation, the size and shape being found by estimating that for every 3 tons of hay the crop may have produced about 10 tons of silage may be reckoned on. Having arrived at an approximate estimation of the weight, the base measurement should be somewhat as follows:—

For 15 tons, 9 ft. by 9 ft.; 20 tons, 10 ft. by 10 ft.; 50 tons, 13 ft. by 13 ft.; 100 tons, 16 ft. by 16 ft.

Only as much of the crop as can be carted and stacked in one day should be cut. A day or two should then elapse before adding more material. Then allow the temperature to rise, and also the mass to subside, which facilitates the work of stacking. In an ordinary large hay stack, the sides are built projecting outwards; this must be carefully avoided in building silage stacks. It is far better to have the sides and ends inclining inwards; there is then less tendency of the stack to lean over, which frequently happens, owing to the fermentation causing unequal settling of the mass. Should this occur, props must be set—at a wide angle—to the leaning side, when, on further subsidence taking place, the pressure brought to bear will bring the stack back to the perpendicular.

From the first load to the completion of the stack the greatest attention should be paid to the outside edges. This is a very important point. The outsides should be always kept higher than the centre when stacking, and should be made more compact by being well trodden down, the centre being left comparatively loose. When finished, the top should be levelled and covered with a layer of straw, pressure being then applied by piling the handiest material procurable on the top, so that a dead weight of about 1 cwt. per square foot is attained.

MAIZE ENSILAGE AT SOUTHBROOK.

Mr. A. E. Gibson has received from the manager of the Southbrook branch of the Queensland National Bank a rather interesting sample of stack ensilage from 2½ acres of broadcase maize, estimated at least at 30 tons. This quantity was found to be amply sufficient to keep twenty-five head of dairy cattle fed on it for fifteen weeks in full profit, with about two weeks' feed left.

The cutting and making of the stack employed two men for eight days between milking hours, the cutting being effective by the use of a binder.

The stack was located on a favourable spot on the farm, and when complete was weighted heavily with logs, stones, and a good coating of earth to keep any dampness out.

For feeding purposes, the material was simply cut out with a hay knife and thrown to the cattle, who took to it greedily.

WEALTH FROM RURAL INDUSTRIES IN SOUTH AUSTRALIA.

In the course of a statement before the annual congress of the South Australian Agricultural Bureau, the Director of Agriculture (Professor Perkins) made reference to pre-war agricultural and pastoral activities and revenue, and showed that the average annual income from those sources between 1911-12 and 1917-18 had been as follows:—Value of crops raised—farm crops, £7,869,000; vineyards, £543,000; orchards, £355,000; gardens and nurseries, £119,000; olive trees, £4,000; returned from sheep, £2,935,000; cattle, £1,601,000; poultry, £568,000; pigs, £325,000; horses, £53,000; bees, £16,000; making a mean yearly aggregate of £14,388,000. Taking the total area of land concerned in its production (125,248,000 acres), the mean yearly agricultural and pastoral revenue represented only 2s. 3½d. per acre. Of the aggregate area, however, 86,104,000 acres consisted of purely pastoral land, situated outside of county boundaries. That area had carried an average of 882,000 sheep, 102,000 cattle, and 23,000 horses, the gross returns from which he had estimated at £1,000,000 per annum. Thus there was left a gross revenue of £13,388,000 from 39,144,000 acres within county boundaries, or about 6s. 10s. per acre. Rrom the general standpoint that could scarcely be regarded as satisfactory, and implied that the country, as yet, was very inadequately occupied, also that there was ample room for that expansion of rural industries which was so greatly desired.—''Pastoral Review.''

1920 COTTON CROP.

In consequence of the favourable price obtained for the 1919 cotton crop and of future prospects, the Minister for Agriculture has decided to increase the advance for the 1920 crop to 3d. per lb. instead of 2d. as heretofore upon cotton in the seed when received at the departmental stores. The balance received from the sale of the lint cotton, less actual cost and charges, will be paid to the farmer upon the completion of the sale. Seed can be obtained free of cost, and railage paid, upon application to the Department.

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The Office of the Secretary of the undermentioned Herd Book Societies is 303 Queen street, Brisbane:—

The Australian Hereford Herd Book;
The Shorthorn Herd Book of Queensland;
The Jersey Herd Book of Queensland;
The Illawarra Herd Book of Queensland;
The Ayrshire Herd Book of Queensland;
The Milking Shorthorn Herd Book of Queensland;
The Holstein-Friesian Herd Book of Australia.

NOTE.—Animals registered in the Commonwealth Standard Herd Book are not necessarily eligible for entry in the Jersey Herd Book of Queensland.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
	DAIRY BREEDS.			
	AYRSHIRES.			
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
J. H. Paten	Gwandalan, Yandina	6	21	Do.
Queensland Agricultural College	Gatton	4	10	Do.
State Farm	Warren	3	83	Do.
J. W. Paten	Ayrshire Park, Wanora, Ipswich	10	42	Do.
J. H. Fairfax	Marinya, Cambooya	9	55	Do.
J. Holmes	"Longlands," Pittsworth	6	20	Do.
H. M. Hart	Glen Heath, Yalangur	7	21	Do.
F. A. Stimpson ..	Ayrshire Stud, Fairfield, South Brisbane	7	77	Do.
M. L. Cochrane ..	Paringa Farm, near Cairns	5	21	Do.
John Anderson	"Fairview," Southbrook	7	34	Do.
	JERSEYS.			
T. Mullen	"Norwood," Chelmer	3	20	Jersey Herd Book of Queensland
Queensland Agricultural College	Gatton	2	31	Do.
M. W. Doyle	"Oaklands," Moggill	4	12	Do.
G. A. Buss	Bundaberg	1	15	Do.
R. Conochie	Brooklands, Tingoora	9	21	Do.
W. J. Barnes	Millstream Jersey Herd, Cedar Grove	10	37	Do.
W. J. Affleck	Grasmere, N. Pine ..	6	31	Do.
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Do.
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	2	11	Do.
State Farm, Kairi ..	Kairi, *viâ* Cairns ..	4	16	Do.
H. D. B. Cox	Sydney (entered in brother's name)	3	16	Commonwealth Standard Jersey Herd Book
	GUERNSEYS.			
Queensland Agricultural College	Gatton	2	2	Eligible, but no Guernsey Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
	DAIRY BREEDS—*continued.*			
	HOLSTEINS.			
Queensland Agricultural College	Gatton	2	9	Holstein-Friesian Herd Book of Australia
George Newman ..	"St. Athan," Wyreema	9	92	Do.
F. G. C. Gratton ..	"Fowlerton," Kingsthorpe	1	15	Do.
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	3	Do.
Ditto	Ditto	1	..	Holstein-Friesian Herd Book of New Zealand
S. H. Hoskings ..	St. Gwithian, Toogooloowah	..	..	Holstein-Friesian Herd Book of Australia
C. Behrendorff ..	Inavale Stud Farm, Bunjgurgen, Q.	3	9	Do.
E. Swayne	West Plane Creek, Mackay	1	2	Do.
	ILLAWARRA.			
A. Pickels	Blacklands Stud, Wondai	4	62	Illawarra Herd Book of Queensland
J. T. Perrett and Son	Corndale, Coolabunia	3	43	Do.
W. T. Savage	Ramsay	2	22	Do.
Hunt Bros.	Springdale, Maleny ..	3	62	Do.
	MILKING SHORTHORNS.			
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Do.
A. Rodgers	Torran's Vale, Lanefield	1	9	Do.
W. Middleton	Devon Court, Crow's Nest	3	27	Do.
A. K. Yorksten ..	"Dunure," Miles ..	2	8	Do.
W. H. Francis ..	"Exelawn," Colinton, Brisbane Valley Line	3	5	Do.
	BEEF BREEDS.			
	SHORTHORNS.			
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
Godfrey Morgan ..	"Arubial," Condamine	3	6	Do.
W. B. Slade	E. Glengallan, Warwick	2	20	Do
	HEREFORD.			
A. J. McConnell ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Do.
Tindal and Son ..	Gunyan, Inglewood	50	400	Do.
	SUSSEX.			
James T. Turner	The Holmwood, Neurum	2	4	Sussex Herd Book of England

The Horse.

PERCHERONS IN U.S.A.

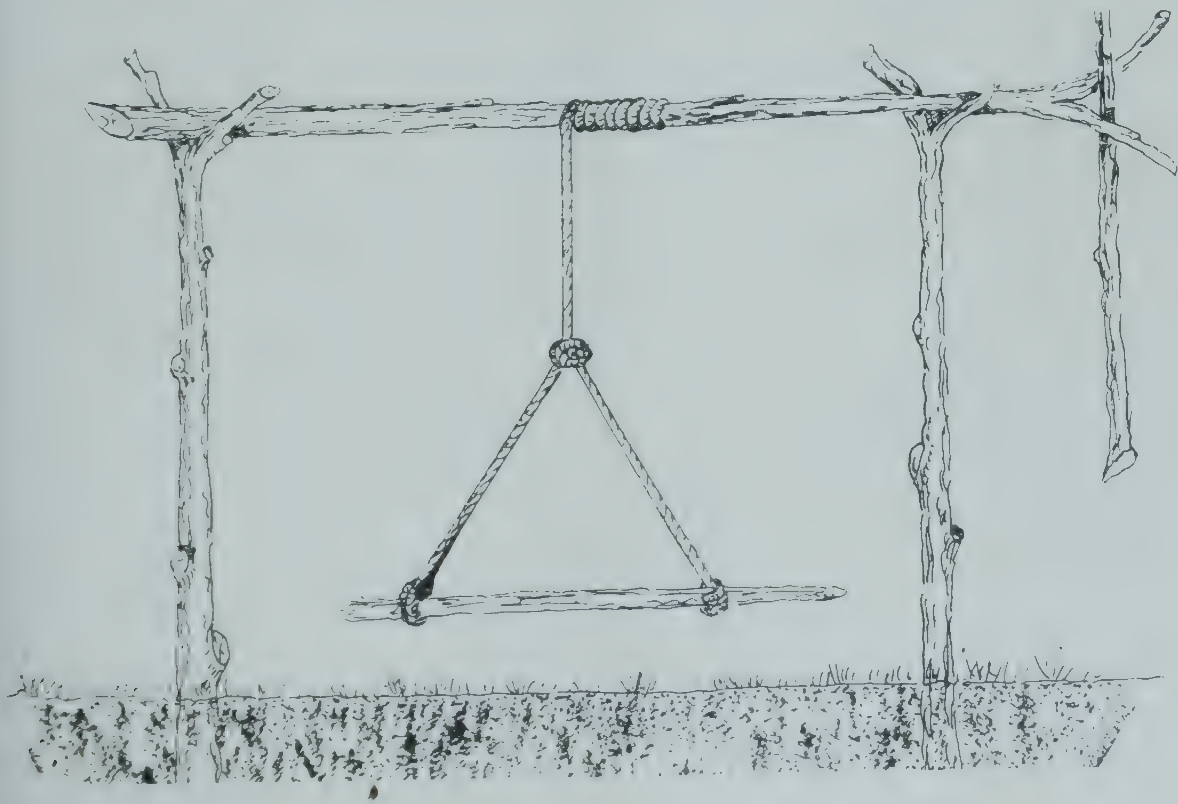
All the important horse-producing States of America, with the exception of Ohio and Texas, now enforce stallion enrolment laws. Collated returns from twenty of these States show that in 1916 the number of stallions registered was 55,806 all told; 41.86 per cent. were described as grade or mongrel stallions, 9.23 per cent. pure-bred stallions of light horse types, and 48.88 per cent. pure-bred draughts. There were in these twenty States approximately ninety mares of breeding age to every stallion licensed for service. It is acknowledged that grade sires should not be used, but the trouble is there are not sufficient pure-bred horses available.

The popularity of the Percheron is illustrated when the returns are analysed. It appears that the registered stallions of this breed numbered 19,199, the next largest being Belgian, with 4,212. Of other breeds there were 2,114 French draughts, 2,006 Shires, 1,275 Clydesdales, and 69 Suffolk Punches. Percherons, in every State, outnumber all the other draught breeds combined. In Iowa and Illinois, the two greatest draught horse producing States, Percherons constitute 60.68 per cent., and 69.32 per cent. of the pure-bred draught sires. In Oklahoma, 85.35 per cent. are Percherons; in Kansas, 77.65 per cent. In the entire twenty States, 66.49 per cent. of the pure-bred draught sires are Percherons, and in ten of the leading States, on which the Percheron Society published similar data two years ago, the percentage which Percherons bear to all pure-bred draught sires has increased from 64 per cent. to over 68 per cent., an increase of more than 4 per cent.

The figures indicate that the Percheron breed possesses outstanding advantages in the eyes of American horsemen. Such an increase, in competition with all other breeds, cannot be mere accident, but is a sure proof of sterling merit.—"Pastoral Review."

FIRST AID TO HORSES.

Mr. H. A. Adams, Yalleroi, commenting upon an article in the October issue of the "Queensland Agricultural Journal" on "First Aid to Horses," sends us the accompanying sketch of a bush sling which is easily made and effective. The sling is made of three forks, and is operated by a short sapling. All that is required is a large flour-bag, a chain, and a piece of rope or wire. The bag is placed under the stomach of the animal, and the two forks are put up, one or each side of where the horse is lying, the bag being put under him. He comes up in quick time. He had often used this in time of drought, and considers that there is nothing better, as usually the forks can be got close at hand and the animal can be fed and watered in the sling. One man can make and operate the whole thing. Mr. Adams's experience will doubtless be useful to many who are far away from veterinary assistance.



Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1919.

In spite of the hot weather prevailing during the month, the output of eggs has been very satisfactory. The score of R. Holmes (B.O.) of 1,008 eggs in seven months is certainly a fine achievement. This same breeder's E bird finished a sequence of 90 eggs, making the break on the 24th of the month. E. M. Larsen's C, which broke on 26th September, after a continuous run of 64, has again not missed a day to the end of the month. R. Burns's D, which missed on 2nd September, after a run of 39, has also continued to the end of October without a miss. The above results are phenomenal, especially as the weather at present is not such as one would expect to permit exceptional scoring in the heavy breeds. The second position in the heavy breeds is being fought for by the 2nd, 3rd, and 4th pens, only ten eggs separating them. The birds in all three pens look fresh. The pens owned by R. Burns and E. F. Dennis each laid 35 eggs in the last seven days, and E. M. Larsen's 36 for the same period. The laying in the light breed single pens has been very good; only one pen, taking the birds as groups, failed to lay over 130 eggs for the month. No sequences of note have been made by any of the light breed single hens. The laying in the section for the leading pens has been, for the last seven days, as follows:—J. M. Manson, 35; T. Fanning, 29; W. Hindes, 28. During the last week broodies have been very troublesome, especially in the heavy groups. There are also more broodies among the light breeds than one would like to see. Three deaths occurred during the month. On the whole the birds look bright and healthy, a state which has been largely brought about by the abundance of green feed supplied to them. The following are the individual records:—

Competitors.	Breed.	Oct.	Total.
	LIGHT BREEDS.		
*J. M. Manson	White Leghorns ...	156	953
*T. Fanning	Do.	165	936
*W. Hindes	Do.	140	913
*Dixie Egg Plant	Do.	138	887
*E. A. Smith	Do.	152	876
*Dr. E. C. Jennings	Do.	146	846
*G. W. Hindes	Do.	141	832
*Haden Poultry Farm	Do.	139	828
*Range Poultry Farm	Do.	141	813
*Quinn's Post Poultry Farm	Do.	153	812
*B. Caswell	Do.	147	786
J. H. Jones (Toowoomba)	Do.	142	781
S. McPherson	Do.	124	779
*W. Becker	Do. ...	146	774
*C. P. Buchanan	Do.	136	772
*L. G. Innes	Do.	158	767
*H. Fraser	Do.	138	766
G. Williams	Do.	119	748
G. J. Byrnes	Do.	121	741
*J. J. Davies	Do.	143	738

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Oct.	Total.
LIGHT BREEDS—*continued.*			
*Mrs. L. F. Anderson	White Leghorns ...	137	737
W. A. Wilson	Do.	128	727
S. W. Rooney	Do.	132	723
H. A. Jones (Orallo)	Do.	120	719
*W. Lyell	Do.	125	715
*Thos. Taylor	Do.	143	709
*Mrs. A. G. Kurth	Do.	142	707
*Mrs. R. Hunter	Do.	131	683
Geo. Trapp	Do.	135	672
G. H. Kettle	Do.	130	668
B. Chester	Do.	140	659
Mrs. N. Charteris...	Do.	123	634
*O. W. J. Whitman	Do.	137	631
C. A. Goos	Do.	125	630
N. A. Singer	Do.	134	626
H. O. Jones (Blackstone)	Do.	111	625
Oakleigh Poultry Farm	Do.	108	620
J. W. Newton	Do.	132	601
R. C. J. Turner	Do.	96	572
W. Morrissey	Do.	114	565
J. H. Dunbar	Anconas	110	553
HEAVY BREEDS.			
*R. Holmes	Black Orpingtons ...	150	1,008
*E. F. Dennis	Do.	157	936
*E. M. Larsen	Do.	152	929
*R. Burns	Do.	152	926
*W. Smith	Do.	144	879
*A. E. Walters	Do.	140	869
Geo. Nutt	Do.	111	860
*A. Shanks	Do.	118	837
*Kelvin Poultry Farm	Plymouth Rocks ...	130	836
*E. Morris	Black Orpingtons ...	133	817
*Nobby Poultry Farm	Do.	122	805
*D. Fulton...	Do.	112	754
*T. Hindley	Do.	131	752
*Jas. Ferguson	Chinese Langshans ...	123	745
*Mars Poultry Farm	Black Orpingtons ...	154	731
*W. H. Reilly	Do.	115	719
*H. Puff	Rhode Island Reds ...	96	686
Burleigh Pens	Do.	103	672
R. B. Sparrow	Do.	149	672
*F. W. Leney	Do.	120	660
A. Homan	Do.	102	646
*T. B. Barber	Do.	112	631
J. A. Cornwell	Do.	118	586
C. H. Singer	Do.	99	579
A. Gaydon	Do.	109	552
H. Ashworth	Do.	108	549
Total	...	8,707	49,760

* Indicates that the pen is being single tested.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	162	151	164	160	157	159	953
T. Fanning	168	169	154	163	150	162	936
W. Hindes	165	157	150	141	150	150	913
Dixie Egg Plant	138	143	157	166	138	145	887
E. A. Smith	142	141	162	144	133	154	876
Dr. E. C. Jennings	145	119	145	138	137	162	846
G. W. Hindes	150	131	152	135	124	140	832
Haden Poultry Farm	153	154	144	134	112	131	828
Range Poultry Farm	115	139	153	154	117	135	813
Quinn's Post Poultry Farm ..	129	141	148	152	123	119	812
B. Caswell	110	76	132	160	170	138	786
W. Becker	160	137	150	117	84	126	774
C. P. Buchanan	113	150	117	121	128	143	772
H. Fraser	104	140	150	131	102	139	766
L. G. Innes	105	149	107	140	142	124	767
J. J. Davies	109	115	131	135	125	123	738
Mrs. L. Anderson	132	143	108	118	110	126	737
W. Lyell	110	126	138	109	115	117	715
Thos. Taylor	138	98	97	139	139	98	709
Mrs. A. G. Kurth	148	124	128	115	79	113	707
Mrs. R. Hunter	106	108	124	120	113	112	683
O. W. J. Whitman	98	132	98	93	110	100	631
HEAVY BREEDS.							
R. Holmes	171	171	187	152	193	134	1,008
E. F. Dennis	175	137	166	152	131	175	936
E. M. Larsen	161	165	162	143	160	138	929
R. Burns	159	142	155	193	140	137	926
W. Smith	119	166	145	133	166	150	879
A. E. Walters	149	140	155	140	131	154	869
A. Shanks	86	108	173	143	153	174	837
Kelvin Poultry Farm	177	120	130	120	151	138	836
E. Morris	137	130	148	142	163	97	817
Nobby Poultry Farm	128	117	118	136	157	149	805
D. Fulton	121	125	132	116	139	121	754
T. Hindley	151	140	98	137	107	119	752
Jas. Ferguson	132	165	105	102	121	120	745
Mars Poultry Farm	102	155	156	88	90	140	731
W. H. Reilly	107	101	143	137	101	120	719
H. Puff	133	97	118	135	96	107	686
F. W. Leney	82	109	125	156	90	98	660
T. B. Barber	96	106	100	105	124	100	631

CUTHBERT POTTS,
Principal.

FOWLS PICKING FEATHERS.

A correspondent at Hughenden writes asking the cause of fowls picking feathers out of each other. Mr. Beard, Poultry Instructor, says that the causes of the vice (scarcely a disease) are various.

Sometimes it is due to parasites or vermin which the birds pick at. More often, the cause can be attributed to improper conditions under which the birds are kept. Overcrowding and insufficient exercise may start the habit. It is a very common complaint amongst birds that are kept in small yards, and rarely occurs amongst flocks that have free range.

Insufficiency of green stuff or animal food may also be the cause; but, in most cases, it is impossible to correctly tell what first started the habit. Whatever the cause may be, in most instances the poultry keeper has himself to blame. Had the opportunity not been there, the birds would not have developed the habit.

TREATMENT.

Make an ointment of 1 lb. of lard and one teaspoonful of extract of aloes. Rub well into the feathers and parts affected, or apply with a sponge an infusion of quassia over the feathers. If one dose does not stop the feather eating, repeat it after a few days. Give more animal food, and plenty of green stuff, and add flowers of sulphur to the mash—one tablespoonful to each twenty fowls, and provide plenty of exercise.

SUNSTROKE AND HEAT APOPLEXY AMONG MUSCOVY DUCKS.

BY R. T. G. CAREY, Beerwah.

These two prevailing calamities, which frequently occur among the young ducklings, are generally the result of want of precaution to erect suitable sunshade; the neglect of which gives rise to so much trouble that the death rate may be appalling, and one cannot afford to lose any of the youngsters, which cost so much both in labour and feed. Now that the Christmas market is at hand, and time fast flying, the fattening foods used to rear them up to market standard create much animal heat; therefore, when a sultry day or a heat wave arrives, these quaint webfooted birds very often get sunstroke or heat apoplexy.

As the muscovy duck season is now well on, mostly every duck should have her family; but as she is an indolent, forgetful, heedless parent, she never considers how her ducklings should be cared for, but allows them to roam and bask in the fierce sun-rays; and it is while thus stretched out and asleep that the damage is done. Therefore, when the attendant approaches them, some are unable to rise, some get up staggering, and others are symptomatic.

In the case of sunstroke, pick up the dear little one and pour cold water on its head. Do that for about ten minutes, then put it into a cool, dark room, and give plenty of nice cool water; feed lightly for a few days, when it ought to get well.

In the case of heat apoplexy, give the youngster a cool bath on the head, or let the tap run gently on it. Place the patient in a shady, cool pen for several days, after which feed with plenty of nice, fresh green herbs or new lucerne.

These webfooted fowls have few diseases, but are liable to contract them. "Prevention is better than cure" is a good old adage. The best antidote for all diseases is thorough cleanliness, with good, wholesome food. This reduces to a minimum any source likely to cause epidemics. There are, however, some ailments that do come on, notwithstanding all care and attention given.

Take pneumonia, caused from exposure to sudden chilly weather, dirty accommodation, or foul pens. As ducklings create great heat when closed in pens or huts, a poisonous vapour arises, the "flu" sets in, and unless diligently watched it wipes out the flock.

To dilate on all ailments would be superfluous, therefore the "axiom of work" is clean water, green food, absolute cleanliness of coops, pens, houses, and every appliance. A plentiful use of disinfectants and some knowledge and brains put into use will keep the principal disease away, and your muscovy duck will be a source of income and pleasure both to yourself and it.

QUEENSLAND WOOL IN LONDON.

The "London Times" states that at the October wool sales in London, Sydney greasy merinos sold from 30d. to 71d.; locks and pieces, 46½d. to 47½d. Queensland scoured merinos sold up to 104d., which constitutes a record. Victorian scoured crossbred (best) brought 75½d., and New Zealand greasy crossbreds sold at 40½d.

The Orchard.

LEMON GROWING AND CURING.

There are many old-time remedies for the ravages of insects, fungoid diseases, &c., in the orchard. It does not follow that, because a remedy is fifty years old, it must necessarily be valueless when compared with more modern discoveries. Our methods of irrigation, for instance, are much the same as we find described in Virgil (Georgic II.). That old agriculturist wrote:—

''What shall I say of the man who, having scattered the seed, follows up the sown field, and heaps up the adjacent piles of ill-productive soil? Then leads the river and ductile streams over the sown land, and when the burnt-up field is hot with dying herbage, behold he brings the wave from the brow of a hilly tract. It, in falling, stirs up a hoarse murmur from the smooth stones, and cools the parched-up field with its springs.''

It is a far cry from Virgil's time (70 to 19 B.C.) to the present day, but the cry for irrigation, whether by rainfall or by artesian bores or wells, is the same to-day as in the old philosopher's time.

In 1897, Mr. W. S. Williams, of Victoria, read a paper on ''Lemon Growing and Curing'' at the conference of fritgrowers in Brisbane. In the course of his remarks, he dwelt on the importance of irrigation.

He had early found, even so far south as Melbourne, that for the successful culture of lemons it was absolutely necessary to have the command of water, as there is generally a short portion of each year when the trees are liable to suffer from want of moisture; and, if water is not at hand when wanted, they suffer in their growth and bearing.

During some abnormal seasons it is not required, but we never know until the time comes, and when the leaves begin to curl it is certain they want a drink to carry then forward, and if this be not supplied it means all the difference between loss and profit.

Any person choosing a site for growing lemons should see that he choose one where he can have a supply of water. The method he adopted in applying water to the trees was to plough furrows on each side of them both ways, and run them full of water as evenly as possible, and next day, when the water had soaked into the soil, to run the disc over to fill the furrows, and leave the soil loose. A fair watering would carry the trees over a month at least in the driest time.

The most suitable soil for lemons he found to be a deep, fine loam, with clay subsoil, which should be under-drained and subsoiled to a depth of not less than 12 inches, then left to lie fallow through the summer. In the autumn the land should be well worked and fined with the disc harrow, and further fined and harrowed with the Acme harrow, then gathered in lands of 20 feet with the plough, and finally harrowed lengthways to bring it into good tilth. If the land is stubborn to break the roller may be used with advantage. He held that 20 feet by 20 feet was the best distance at which to plant, at all events in his district, the distance being accurately measured by means of a strong wire marked at every 20 feet, stretched across the land, and the trees planted at each mark. Care must be taken in planting not to plant deeper than the nursery mark, as the top roots should only just be covered with soil, which should have a decided fall from the neck of the tree; otherwise they may contract collar rot through water lodging round them.

Regarding shelter, to produce a good percentage of clean-skinned fruit the trees must be sheltered from heavy winds, either naturally or artificially.

In undulating country, lemon trees should not be planted in the gullies, as the frost would destroy large numbers of both trees and fruit.

For artificial shelter, nothing beats the *Pinus insignis* planted 20 feet apart in the rows, and the rows 10 feet apart. In six years they will come together and form a perfect breakwind 20 to 30 feet high. A double row of loquat trees also makes a good break. For manuring, the most useful is a blood manure, superphosphate, and a small portion of kainit, used alternately. Stable manure, where procurable, tends to keep the ground loose among the trees. Peas, sown in autumn and ploughed in early in the spring, are very beneficial, as they add nitrogen to the soil and keep it open. The soil should never be allowed to set around lemons. Mulching outside of the drip of the trees tends to bring the roots too near the surface, and thus interferes

with working the land during summer. After any fall of rain of any consequence during summer, the land between the trees should be gone over with a disc harrow or cultivator, and loosened to a depth of 3 or 4 inches, and underneath the trees the long-handled Dutch hoe should be used, so that the moisture may be retained in the soil. In a well-kept orchard, the foot should always sink in the soil, and no weeds ought to be seen during the summer.

Is there any general system of pruning lemon trees? Mr. Williams said he had searched, and inquired in every place he had visited where citrus fruits are grown, for a system, but had found that no general system was recognised. Some growers never cut a tree under any circumstances, and maintain that it is wrong to do so. Others, again, trim the tops to give the tree symmetry and balance. Such plans may do for some years, but ultimately the trees suffer and die a premature death, as the lemon, as a rule, is a very heavy bearer, and, if left to Nature with regard to pruning, it kills itself by bearing. After some experience, Mr. Williams came to the conclusion that lemon trees should be systematically pruned. The best time for the operation is in the spring, and by what he terms "back-pruning"—that is, beginning in the centre of the tree, and removing a portion of the off-shoots from each limb outwards, always taking care to leave foliage enough to shade the inside of the tree. A main point is to keep the tree fairly balanced by removing strong stem shoots, and keeping the tree growing fairly evenly all over, for if one portion is allowed to take the lead, it does so at the expense of the other portions of the tree, which, besides rendering it unsightly, also injures its bearing powers.

If the system he advocated were followed out, the tree would receive proper light and air, it would be less liable to insect pests, and the fruit would come more even and clean inside and outside alike, besides adding very materially to its length of life. On the gathering and curing of the fruit, Mr. Williams said that lemons, to have the best colour and quality for table use, should be cut off the tree with a proper fruit-cutter, and handled with great care, or else a large percentage will spoil in curing. They should be taken off when the fruit is changing colour, and left for a day or two in the open air before putting away. They should then be placed in trays in single layers, and placed in a dry, dark collar of even temperature, not at any time over 60 degrees F. The trays may be placed on each other to any convenient height, and in three weeks should be moved and examined and wasters removed. In the course of a month, they should be gone over again, when all that are likely to go wrong will have done so. The lemons are then perfectly cured, and should be of a beautiful, bright-yellow colour.

The cells are decomposed, and give out the juice freely and of far better quality than if taken off the tree direct. The lemons can then, if wrapped in tissue paper, be sent any distance if kept moderately cool and dry, or stored to meet the charges in the market. Mr. Williams incidentally mentioned that he has frequently kept his lemons twelve months with very little change after the first seven or eight weeks.

PRESERVING SMALL LOTS OF GRAINS FOR SEED PURPOSES.

It is well known that unless special provision has been made in the way of air-tight tanks, fumigation, &c., it is a most difficult matter, on the coast, to keep seeds such as cowpea, grain, sorghums, maize, &c., free from weevils.

It has been found that weevils cannot multiply in grain unless it contains a certain percentage of moisture. In wheat, for instance, there has to be at least 10 per cent. present. When harvesting it invariably contains from 6 to 7 per cent. moisture, and is therefore weevil-proof.

A simple method of keeping the moisture content under weevil requirements is to use a vessel or container as air-tight as possible, such as a tank, petrol tin, old cream can, &c., and when storing seeds to include a quantity of freshly burned lime. In the event of the container not being insect-proof, the bags containing the seeds should be covered right over with the lime. In fact, the lime can be mixed with the grain without a detriment. In order to ascertain whether lime would be injurious to vitality, a number of maize cobs and grain sorghum heads were buried in partly air-slaked lime in the month of June. A vitality test was carried out in September, the maize giving 100 per cent. and the sorghum 98 per cent. germination. A further test was made at the end of December with practically similar results.

The cost of the lime used in the preservation of perishable products would be almost nil, as it can afterwards be applied to the land with, in most instances, considerable advantage.—"Journal of the Jamaica Agricultural Society."

Tropical Industries.

THE CULTIVATION OF SUGAR-CANE IN QUEENSLAND.

By HARRY T. EASTERBY, General Superintendent, Bureau of Sugar Experiment Stations.

PART V.

CANE CULTIVATION ON OLD LANDS—*continued.*

PLANTING, SUBSEQUENT CULTIVATION, AND RATOONING.

Having got our soils in perfect tilth as previously described, we must now turn our attention to the planting, upon which so much depends. The greatest supervision should now be exercised, so that only good, sound plants, free from disease, are selected. Even if it is necessary to pay a somewhat higher rate for good plants from outside, it is well worth while. Generally speaking, plant cane from 10 to 12 months old, or first ratoon of the same age, should be taken. Now that canes are paid for on analyses, it is perhaps hardly needful to point out, except to beginners, that only good sugar-producing varieties should be used. If the time of planting corresponds to that of harvesting, it is a good plan to cut as many top plants as possible from the best of the cane going to the mill. These are undoubtedly superior to the parts of the cane situate lower in the stick, although it is claimed that butts also make very good plants. The top plant, however, has the minimum of sugar and contains nitrogenous bodies and salts which form food material for the plant during its early stages of growth. Top plants cannot always be procured, and it is then usual to cut up the whole stick for plants. It is preferable for a farmer to change plants with a neighbour rather than to grow cane continually from his own seed. Cane should also be brought from colder to warmer climates and from hillsides to lower levels, when it is invariably found to do well.

The best width of row has been found from numerous experiments in Louisiana, Hawaii, and Queensland to be 5 feet, though in the case of a straight growing cane, such as D 1135, this could be reduced to 4 feet 6 inches. The drilling is best accomplished by means of a double mould-board or drill plough. The plough should make a good wide drill about 9 to 10 inches deep in the loose soil. Where the cultivation has been deep and good, this will leave a few inches of soil for the plant to lie on. Some farmers believe in going very deep with the plough, and cleaning everything out to the hard bottom, but our experience has been that better results are obtained where a certain amount of loose earth is left at the bottom of the furrow. Moreover, in a dry time, when planting by hand, there is usually a certain amount of moisture in this loose soil into which the plants can be pushed down, and so give them a much better opportunity to strike more rapidly. Three-eye plants are almost universally favoured, but the distance at which the plants are to be spaced apart in the row varies greatly in the different districts. At

Bundaberg the plants are often placed 12 to 18 inches apart, while on the Herbert River the planting is almost continuous. A good average distance for the spacing, and one we have found to give good results, is 6 inches. The plants are usually put in about 9 inches deep when planting by hand, and covered with from 2 to 4 inches of soil—2 inches when conditions are very moist, and 4 inches when they are very dry. When planting by hand, the cane sets should be laid in the ground with the eyes at the sides if possible. The cane-planting machine is now coming into great favour, and, while spacing cannot be carried out so evenly by its means, it puts the plant well down into the moist soil. It is a great labour saver, and many types of machine are now upon the market.

The subject of applying manures to the crop will be left till later on.

As soon as the cane is up about 6 inches, the subsequent shallow cultivation should commence, and this, if properly done, is a factor which materially contributes to the after success of the crop.

CULTIVATION.

Shallow cultivation, after the crop is up, conserves moisture. One of the world's leading authorities upon the culture of cane (Professor Stubbs, of Louisiana) says:—"The cultivator should be run as frequently as possible, so that a thin layer of earth is removed from the great body of soil and laid as a mulch upon the surface. In this way, the continuous upward movement of moisture through the soil into the air is checked just below the surface, so that roots of plants can appropriate it. The finely divided earth on the surface has the power of attracting hygroscopic moisture from the air—a not insignificant fact in times of drought with heavy dews at night. The question may be asked: 'Which best promotes the above advantages? The cultivator, which stirs only to a limited depth and never inverts, or the plough, which runs 6 to 12 inches deep, completely inverting the soil and burying plant foods and ferments beyond resurrection for the growing crop?' The plain and candid reply is—the cultivator. Again, but little stress has been laid upon the damage done by the frequent cutting of the cane roots by ploughs, a damage often fatal to good crops." So impressed were Louisiana farmers by this reasoning that they, many years ago, abandoned the cultivation of cane between the rows with the plough.

Professor Hilgard ("Soils") says:—"The loose tilth of the surface, which is so conducive to the rapid absorption of the surface-water, is also, broadly speaking, the best means of reducing evaporation to the lowest possible point. . . . It is true that relatively coarse compound particles are incapable of withdrawing capillary moisture from the dense soil or subsoil underneath, just as a dry sponge is incapable of absorbing any moisture from a wet brick, while the dry brick will withdraw readily nearly all the water contained in the relatively large pores of the sponge. A layer of loose, dry, surface soil is therefore an excellent preventive of evaporation, and to moderate the access of excessive heat and dryness to the active roots."

This method of cultivation is practised at all the Experiment Stations, the implement in use being a Planet Junr. cultivator, fitted with broad sweeps or hoes. Uniformly good results have followed this procedure.

While the use of a disc harrow may be permitted during the early stages of the crop, especially when some form of drill cleaner is pulled behind, its use should be prohibited directly it is found that the young cane roots (which subsequently begin to stretch out laterally) are being cut. There are now many devices in use in the cane fields to obviate the labour of "chipping" or weeding the drills by hand. In some of these a form of bent harrow is pulled behind the disc harrow or a two-row cultivator. This bent harrow sits in the drill, and if the weeds are taken when they are small they can nearly all be removed in this way. Others use a light form of triangular harrow in the drill, such as a strawberry cultivator. Special forms of implements for cleaning the interspaces and the cane drills at one operation are also to be procured. With a little ingenuity, however, something may easily be devised to clean the drills, but this must always be done while the weeds are small. If they are left too long, there is nothing for it but expensive hand hoeing, and in any case there is always more or less of this to be done, but a great deal of it can be saved by taking the weeds in time. The cultivator should be run regularly through the cane whether there are weeds or not, so as to ensure the crop getting all the benefits from the cultivator and to conserve moisture during dry times.

If the above instructions have been followed, the season favourable, and the land of fair average quality, a heavy crop of cane should result. This on old lands is usually easily harvested, as facilities in the way of tramlines are, as a rule, provided. The cost of cutting is of course governed by the Award of the Arbitration Court for the time being. Farmers should be particular in having their cane cut to the ground level, or slightly below it, because if this is done the cane ratoons very much better. Unsightly stumps of cane sticking up above the soil for 3 or 4 inches or more should be strongly condemned. The burning of cane, unless it is absolutely necessary, should not be allowed either, as it entails a loss to both grower and miller.

When the cane is harvested it is necessary to turn to the ratooning of the cane—*i.e.*, the second growth of a crop from the stools of the first or plant crop.

DISPOSAL OF TRASH.

As soon as the cane is cut the farmer must make up his mind as to what he is to do with the trash or dead leaves and tops from the preceding crop. The tops whilst green are to a large extent used for forage purposes, so that, as a rule, there are not many of these left. The trash is usually burned in Queensland, and there is a good deal to be said in favour of this method, provided humus is restored at intervals by the growth and ploughing under of a good green manure crop. Trash often forms a harbour for vermin, pests, and fungous diseases of many kinds. It has been claimed that the increase in a ratoon crop, due to excellent cultivation, rendered possible by burning the trash, will more than compensate for the fertilising ingredients lost in burning.

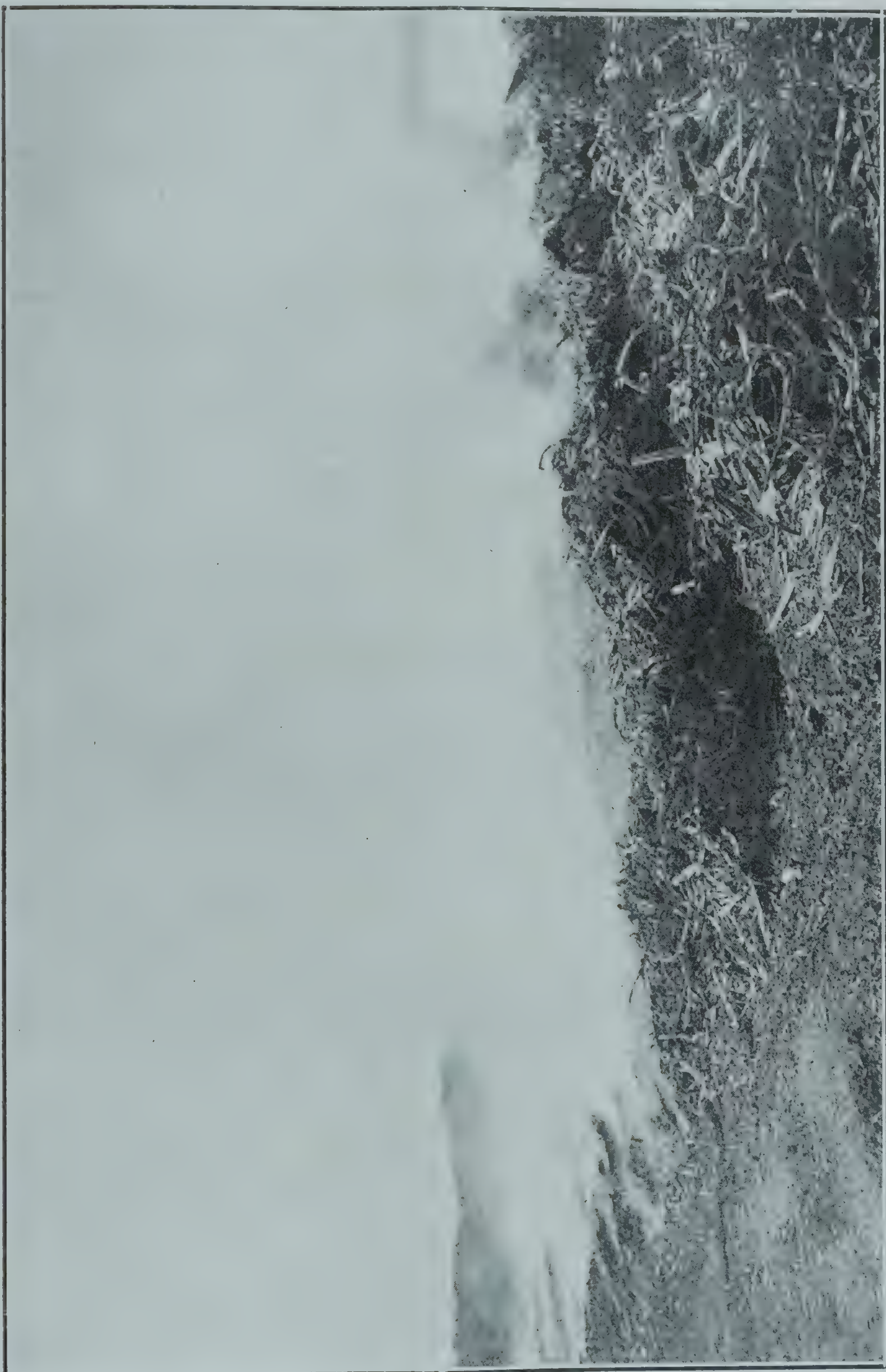


Plate 26.—Burning Cane Trash.

A method of ratooning used at the Mackay Sugar Experiment Station has given large yields of ratoon crops. It is as follows:—

It is believed that the best method of securing large yields of ratoon cane is to adopt the following procedure:—Immediately the trash is burnt, open up the middles of the rows to a depth of 9 inches with the swing plough; next subsoil these two furrows so that a further depth of 6 inches is thoroughly stirred. Next plough away from the cane rows on to the middles and again follow with the subsoiler. By this means the whole of the ground between the rows has been moved and stirred to a depth of 15 inches; and the benefit to the ratoons in thus breaking up the hard ground and letting in air and sunlight is difficult to over-estimate. Subsequent shallow cultivation with broad hoes should now be practised frequently, in the same manner as recommended for the plant crop.

The results obtained at the Experiment Station, due to this method of cultivating ratoons, are detailed in the table below:—

Crop.	Yield of Cane per Acre where the Ground between the Rows was Ploughed and Subsoiled.	Yield of Cane per Acre where the Ground between the Rows was only Ploughed to 8 inches.
	English Tons.	English Tons.
First Ratoons	38·9	27·0
Second Ratoons	31·3	19·2
Third Ratoons	20·4	9·91

These experiments were not fertilised.

By adding manures as hereafter mentioned still larger results have been obtained. The usual methods practised by farmers, however, do not make use of the subsoiler. The following are favourite ways of ratooning:—

(*a*) Trash burnt and four furrows ploughed between cane rows. Land levelled down by use of tyne harrows or cultivator.

(*b*) Trash burnt, procedure same as above, but only three furrows ploughed between rows.

(*c*) Trash burnt and ground cut up first with disc harrows cross-ways. Then use of plough between rows followed by tyne harrows cross-ways.

(*d*) Trash burnt, four furrows ploughed between rows and skeleton plough used in furrows next to cane.

(*e*) Trash burnt and land treated with spring tooth cultivator or a grubber instead of being ploughed.

(*f*) Trash left and rolled in each alternate interspace. Every other interspace well cultivated with the plough. In this way each row of cane has one side cultivated and one side uncultivated, but covered with trash.

(*g*) Trash left and cane allowed to volunteer without any cultivation at all. This method is sometimes advantageous in a droughty season, but is not to be recommended as a regular thing.

All these methods are in use, or some variation of them. In the writer's opinion the best cultivated ratoons (other things being equal) give the highest yields, but it is often a question of cost.

[*To be continued.*]

Dairying.

RATIONS FOR A DAIRY COW.

Mr. A. E. Graham, Government Dairy Expert, in reply to a correspondent asking for advice as to the best-balanced daily ration for a dairy cow, gives the following proportions of wheaten meal, lucerne chaff, and molasses, which will fairly well meet the case of cows which have been milking for three months and are in good condition:—

Ration No. 1—

5 lb. of wheaten meal.
10 lb. of lucerne chaff.
3½ lb. of molasses.

Ration No. 2—

2½ lb. of wheaten meal.
14 lb. of lucerne chaff.
3 lb. of molasses.

Ration No. 3—

7½ lb. of wheaten meal.
7 lb. of lucerne chaff.
1½ lb. of molasses.

The purpose of the alternative ration given is to allow you to select whichever food is available at the cheaper rate to as full a degree as possible.

The rations given are somewhat faulty, as they fail to provide an adequate amount of dry matter required by a cow. It is considered, however, that the animals will be running in a paddock, and no doubt will pick up some roughage, even if the supply of same is limited.

An equally good ration may be provided by the substitution of bush hay or any clean white straw for the molasses. The complement of hay or straw necessary will be slightly in excess of the amount of molasses stipulated.

REMEDY FOR A SELF-SUCKING COW.

In connection with the steps to be taken to prevent a cow from sucking, it must be first ascertained whether the cow sucks her teats while lying down or in a standing position. (Cows may suck in either position.)

In the latter case, a moderately efficacious means of overcoming the trouble is to affix upon the cow a headstall with a nosepiece comprised of stout leather; through the leather ordinary 2½-inch wire nails are driven, the pointed ends being exposed, and, to keep the nails from retracting, a strip of tin is fastened to the leather band over the heads of the nails, the points of which may be sharpened, if necessary, with a file or upon a grindstone. The points of the nails prick the hide of the cow whenever she attempts the sucking.

In instances where a cow sucks her teats while lying down, the above remedy may not always prove satisfactory, as frequently, when the animal is lying at rest, the teats may be sucked by the cow without bringing the points of the nails into contact with her flanks. To meet such cases, take a triangular-shaped piece of light wood, cut off the apex several inches down the triangle, and hollow the remaining piece of wood directly below the cut, leaving the edges of the wood available to fit into the nostril cavities, and thereby gain support for the piece of wood which falls over the mouth of the animal and debars her from sucking, her at liberty to graze and take water. (*See rough sketch in margin.*)

If heavy wood is used, or the points of wood which act as a hinge are left in a rough condition, the nose of the animal may become chafed as a consequence.

Many experienced dairymen remove from the herd any animal that develops the habit of "sucking," but possibly there are exceptional cases where the application of remedial measures is warranted.

Forestry.

CONSERVANCY OF OUR FORESTS.

By THE EDITOR.

In view of the reckless disregard of the future of the timber supplies of our forests in all parts of the State by those engaged in the sawmilling and exporting of our most valuable timbers, we are led to repeat what we wrote upon this subject nearly twenty-five years ago, drawing attention to the apathy with which the bulk of the population, who are not immediately interested in the timber trade, view the question of a future supply of one of the most important of our natural products. The reason for this culpable disregard of the future lies in the fact—first, that the generality of people are ignorant of the value and extent of our forests from a climatological point of view; secondly, from a hazy idea that our supplies of timber suitable for building purposes, for railway sleepers, wood-paving, piles, telegraph and telephone poles, fencing material, &c., &c., are inexhaustible.

Having had considerable practical experience in the timber trade, timber-getting, &c., in Victoria, and subsequently in the early days in Queensland, I am in a position to prove, not only that our timber supplies are not inexhaustible, but that many districts have become absolutely denuded of all timber suitable for the above purposes, and that, in some instances, even timber for firewood is no longer obtainable. Whilst most countries under European rule have been, previous to the war, expending vast sums of money in not only preserving existing forests, but also in re-afforesting large areas already denuded of timber; whilst in the United States, many millions of acres are reserved as State Forests: we, in Queensland, appear to have been, and still to be, bent upon getting rid of these valuable assets as quickly as we possibly can, never stopping to think of the future or of the trouble which must inevitably follow such a mistaken policy. Yet, all the while, Nature herself is trying to teach us the lesson that forests are an absolute necessity for our well-being.

A constant warfare is going on between man and Nature, in trying, the one to subjugate the forests, the other to assert the imperious necessity for their continuance. If man were to desist from the struggle, the forest would predominate almost all over the world. We can well imagine the forests of the prehistoric world, before man became a denizen of its densely timbered solitudes.

Palæo-botanists have given us a very fair idea of the trees of our earth in primeval times. The whole face of the dry or swampy land was occupied by enormous trees which have only diminutive representatives at the present day. Lycopods, which now only grow to the height of, at most, 3 feet, then attained an altitude of from 80 to 100 feet. For countless ages, these dense forests grew and flourished, and then were overwhelmed by some convulsion of Nature, to be buried beneath hundreds of feet of rock, sand, or clay, until once more brought to the surface in the shape of coal, whilst fresh forests grew above them to be submerged in their turn. Still, Nature kept on the struggle, and proved victorious.

We may see the same struggle going on to-day under our own eyes. If we fell a dense scrub and burn off every stick of timber, and take out every stump, and then leave it to itself, what do we observe? That in a few years, a new scrub clothes the denuded patch with a dense growth of, generally, dissimilar timber, which obliterates all traces of man's handiwork. This is particularly plainly to be seen in Papua, where the writer saw, in the midst of a dense scrub, considerable areas of a totally different kind of vegetation, the trees being apparently all of the same age. These were explained as plots which had long ago been cleared and cultivated by the natives, and finally abandoned, with the above result.

In some more densely peopled countries, man is generally the conqueror, and that to his own detriment. He has employed his art to turn vast stores of timber—the growth of ages—to manufacturing uses. Had he stopped here, all would have been well. Forests are made for man's use; they are intended to be cut down as required. But in his insatiable greed and want of foresight, he has destroyed the timber on large areas of once fertile country, and, as a natural consequence, the land has become, in many cases, unfit for agriculture or pastoral occupation. The covering of timber preserved the soil from being baked by the sun, as well as from being frozen up by the icy blasts of winter. The falling leaves and rotting trunks formed a rich humus for the growth of succulent grasses and herbs, whilst the roots of the trees, assisted by those of the herbage, held the soil together, and the heaviest rains and floods were powerless to carry away the fertile parts of it, and thus there was always

a continual supply of grass on the forest lands for the fattening of stock, and whatever was required for cultivation purposes, was nourished, as stated, by the fallen leaves of many centuries, and the crops were sheltered from wind storms by the surrounding forest.

Now, see what man has accomplished by his ruthless destruction of the forests and scrubs. He has laid bare the slopes of the hills where, previously the fertility was regulated by the gentle flow of rainwater as it found its way towards the level country. There is nothing now to impede the rush of water descending in torrents from the hills and mountains. The surface soil is disintegrated and carried down on to the low, fertile lands, often covering them up with a mass of sand, shale, and other rocks, and thus rendering them, in their turn, useless for cultivation; and the result of this destruction of the forests has been that where we once saw smiling fields and luxuriant crops, there now only remains a barren wilderness of rock and sand, with a scanty covering of almost useless grasses and herbs. The cleared scrubs on the hillsides gradually lost their upper stratum of humus, and the crops, becoming scantier year by year, indicate the mischief which has been done.

Now men are slowly awakening to the necessity for reproducing these lost forests artificially, and of conserving those still remaining, by legislative action.

In Queensland, we are still in the destructive stage, although something has in the past, been done by the Government to protect and replace the valuable timber trees of our forests and scrubs. Here and there, attempts have been made by private individuals to preserve and replant some of the indigenous scrub timbers. The writer, in 1879 planted a few hundred young red cedar trees in the scrub on his property from which the railway station, "Forest Hill," near Laidley, takes its name. That property fell into other hands, and to-day the scrub and the planted trees no longer exist. But for one tree planted, there are 10,000 destroyed by axe and fire, and this senseless destruction will go on until more attention is paid to the warnings and instructions so frequently issued by the Department of Agriculture, and by the Forestry Department of Queensland. Reports on the subject by such Government officials as Mr. P. McLean, when Under Secretary for Agriculture, the late Mr. P. MacMahon (a former Curator of the Brisbane Botanic Gardens), Mr. A. McDowall (formerly Surveyor-General), and other experts, in 1890, are still deserving of thoughtful consideration, dealing, as they did, with the whole subject of Forestry.

Take, as an instance, what Mr. McDowall said on the shameful waste of our timbers, and the effect of their destruction on the country:—

"It can hardly be questioned that the time is approaching when the wholesale destruction of timber in many parts of the colony—much of it of a wantonly wasteful nature—will be severely felt. Suddenly, when the depredations of a careless population have produced the inevitable result, the subject of forest conservancy will assume a prominence not yet accorded to it, and it will be a matter of general wonder that our shortsightedness did not allow us to realise that destruction without replenishment must lead to scarcity."

As we have said, "Forests were made for the use of man," and, if properly managed, a perpetual supply of timber for all purposes can be maintained. This was practically demonstrated by a firm of sawmillers who held large timber selections in the Noosa district at Lake Cootharaba (McGhie, Luya, and Company). These far-seeing timber merchants kept up a regular supply of kauri and hoop pine by judicious, systematic thinning. The scrubs on their properties contained great quantities of these valuable soft-woods, and, to ensure constant supplies, the land was divided into large blocks, of which one was culled of all pine timber of a certain diameter. When this first block was worked out, the next was taken; then, the others in rotation, until, at the end of five or six years, a large quantity of the pine in the first block, left untouched after the first thinning, had reached the stated diameter, and was ready to be again thinned. Meanwhile, all the young saplings were coming on for use in after years, and thus the supply might be called perpetual.

To-day most of this land has been cleared for agricultural purposes, and the timber trade, once so prosperous there, no longer exists. It is probable, although the best authorities are not agreed upon the subject, that to the wholesale destruction of our forests and scrubs may be attributed the lessened rainfall and consequent drought in many pastoral and farming districts. It is generally supposed that timbered districts attract more cloud moisture than bare, treeless plains.

Writing of "Forests in Relation to Climate and Rainfall," Mr. W. Schlich, at one time Principal Professor of Forestry at the Royal Engineering College, Cooper's Hill, and late Inspector of Forestry to the Government of India, said:—

"The relation between forests and the climate and rainfall of India is of a very peculiar nature. On the one hand, a covering of forest vegetation reduces the

temperature of the air and soil, and increases the general humidity, and tends to increase the rainfall; while, on the other hand, the exceptionally high temperature which prevails in spring and early summer over the centre of the Indian peninsula brings about the summer monsoon rains, on which the welfare of India depends. In other words, extensive afforestation might increase the quantity of locally-formed clouds and produce local rainfalls, but it might also weaken the force of the south-west monsoon wind and, consequently, the accompanying rainfall.

"It is, perhaps, difficult to say what the ultimate effect of a general afforestation might be, but it may reasonably be assumed that the effects of forests, however extensive, are not likely to produce a quantity of rain which would make up for any weakening of the south-west monsoon. As a matter of fact, however, more than half the area of Madras, Bombay, the North-western Provinces, and Bengal is under cultivation, and a considerable additional area has been appropriated as grazing grounds, so that not more than one-fourth could remain under forest—an area which may be sufficient to moderate the temperature locally, but which is not likely to interfere with the advent of the south-west monsoon. The latter must be, for ever, the main source of moisture in India.

"Apart, however, from these theoretical speculations, *it has yet to be proved whether afforestation in low or level lands affects the rainfall at all.* [The italics are our own.—Editor.] The extensive observations made during late years in Europe have not yet led to any final conclusions, and those carried out in India have not extended over a sufficient number of years to permit of any conclusion at all. Several stations which show a specially large increase in rainfall are either situated far from the reserves, or in their vicinity little forest conservancy has been effected."

Again, with respect to floods, the roots of the trees on the hillsides bind the soil together, and, as a natural consequence, the rains sink gently into the ground, being intercepted by the roots and the undergrowth. When these are gone, the super-abundant water rushes, without hindrance, down the hillsides, carrying off, in its course, the best of the soil, and leaving in its wake great gullies which previously were only tracks. The mass of water has no time to permeate the soil, but makes its way straight to the creeks and rivers, which, swollen to an abnormal height, overtop their banks and submerge the surrounding low country, carrying ruin and desolation to many a before-smiling home, and involving the State, as well as private citizens, in enormous amounts to make good the loss. How often has this been the case in Queensland!

Now, the first subject of inquiry which suggests itself is: What are the causes which operate wastefully and injuriously upon our timber supplies?

In answer to this question, it will be found that the waste in a primeval Australian forest is apparently very great. In forests and scrubs, still untouched by the hand of man, vast quantities of large timber, including several varieties of hardwood, pine, cedar, and beech may be seen strewn over the ground. To the ordinary eye, this would appear a heavy loss, and so undoubtedly it would have proved, had there been a population a hundred years ago to utilise it. But these trees had long ago arrived at maturity and commenced to decay (a necessary process of Nature in the interests of the young timber), or else they have been attacked by termites and grubs, which perforate the wood, and thus render it useless for any other purpose than that of firewood. Much destruction may also be set down, not only to the ravages of white ants, but also to the effects of violent windstorms (as only lately exemplified by a cyclone in the Cairns district) and lightning. These causes, then, can hardly be taken into consideration as wasteful. For the latter result, we must turn to bush fires and the hand of man.

With regard to the first—*i.e.*, bush fires—their operation is scarcely so apparent in the comparatively densely-peopled Southern coast districts of this State as it is further to the northward and westward, where the population is sparse and over-stocking is avoided. In some portion of the latter part of Queensland, the grass, during the rainy season, grows to an incredible height, often so high as almost to conceal a horse. In addition to this, climbing plants and annual shrubs grow thickly amongst the dense herbage. When the rains are over, and the dry winter season has fully set in, bush fires of enormous extent occur, either owing to the carelessness of travellers, or to the wilful act of the aborigines, who fired the grass in past years for the greater convenience of hunting or travelling. Such fires are very destructive to the young timber, thousands of young saplings falling victims to the flames, or to the fall of the worn-out giants which sheltered their young growth. These bush fires are frequently followed by a dense growth of young black wattle scrub, and the super-abundant shade thus supplied has the effect of checking the germination of seeds which fall in thousands from the larger trees. The loss by bush fires does not apply to the dense scrubs (or jungles), which, owing to the moisture retained by the thick undergrowth, are practically fireproof.

We now come to the waste caused by the progress of settlement. This we find to be the most serious, and most requiring instant and earnest attention. In the early days of settlement in Queensland, when agriculture received little or no attention, the dense scrubs in the South, on the banks of the Brisbane and its tributary creeks; the Logan, Albert, Pimpama, Coomera, Nerang, Pine, Caboolture, Maroochy Rivers; and in the North, the Burnett, Mary, Barron, Johnstone, Bloomfield, and other rivers; many eastern rivers, besides scrub-clad mountain ranges: were rich in supplies of magnificent hoop and kauri pine, cedar, beech, silky oak, yellow-wood, maple, &c., &c., whilst on their edges, and in the forests, were quantities of stately eucalypts of many kinds.

In time, splitters and timber-getters got to work and "picked the eyes" out of the timber districts. Then commenced the losses and waste. It is well known to the initiated that many trees, fair to the eye, at a certain height from the ground, prove to have a "wind" further up. Other trees are so "interlocked" as to entail too much labour in the splitting. This "wind," twist, or "interlocking" renders that portion of the tree valueless to the splitter, whose business would not admit of his utilising it by cutting roads through the scrub to draw sound, but, to him, useless logs, to a river for transmission per punt to a sawmill. He, therefore, abandoned most, if not the whole, of a fine tree containing from 600 to 1,200 feet of sound timber, which, in the course of nature, decayed and was lost for ever, as far as saleable timber was concerned.

Often, a tree would hang suspended by the tough, rope-like vines overhead. (I am, of course, alluding to timber-getting in the scrubs.) The splitter found it simpler to fell another tree out of the abundance around him, than to lose time by cutting away the surrounding scrub, by which means alone could he secure the fall of the first. Again, trees were often lost by felling them on gusty days. The result was frequently what is technically known as a "kick-up"— that is to say, before the saw had fairly cut into the "shoulders," the wind seized the head of the tree, and, there being too much wood uncut by the saw, the tree split from the stump to a height of from 5 to 15 feet, then broke off short, when it either remained supported by the split stump, or fell to the ground, useless as a mill log. Floods again were a great cause of loss. Hundreds, if not thousands, of logs of both pine and cedar have been swept out to sea, the owners being powerless to save them. Some years ago numbers of fine pine and cedar logs might have been seen above high-water mark lying piled up on the beach between Southport and the Tweed Heads, carried out to sea from the rivers.

Fifty years ago there were large areas on the Brisbane River from what is now St. Lucia, away up to and beyond the Seventeen-mile Rocks, where hoop pine in the scrubs then standing, and hardwood on the forest lands adjacent to the river, offered a good living to the timber-getters and splitters. The writer was then engaged in the business (in 1863), and the following figures will show the amount of forest denudation which can be, and was effected by three men. The quantity of log timber they cut and despatched from the above area in one week alone amounted to 38,404 feet, or 47 logs. Gum and ironbark sold at 4s. per hundred to the Kangaroo Point sawmills. This does not include a quantity of pine logs which were rafted down the river. Large quantities of shingles, both pine and hardwood, were also obtained in this district. and here the waste was very great. Many trees were felled which proved unsuitable for shingles, and thus splendid sawmill material—the trees ranging from 600 feet to 2,000 cubic content—was left to go to waste where the trees fell.

Droughts have operated equally disastrously. Men have worked for two or three years. with expensive appliances in cedar scrubs. Vast quantities of splendid logs have been hauled to dry creeks communicating with navigable rivers, in the expectation that the periodical floods would carry them to the spot where a raft could be formed, but the floods have, on occasions, not been heavy enough to perform this work, and the result has been that the logs were left to rot on the creek banks.

But even all this destruction has been as nothing compared with that caused by agricultural settlement, and by indiscriminate licensing in "the good old days."

I will do most farmers the justice to say that they preserved as much of the heavy pine they found in the scrub land they had purchased, but the exigencies of their avocation demanded the clearing, burning off, and stumping of their land. Hence myriads of young pine trees, beech, silky oak, and yellow-wood in the South, cedar, silky oak, maple, &c., in the North, were unavoidably destroyed. I have, myself, for farming purposes, been compelled to cut down trees which, had they been growing until now, would have been valuable food for the sawmill.

The losses accruing to the State, however, by agricultural settlement are partially recouped by the substitution of one commercial product for another, and although it may fairly be argued that an acre of maize is not an equivalent for an acre of pine or cedar in a marketable condition, still, as it would require from twenty to fifty years—according to soil and situation—to produce an acre of pine trees 2 feet in

diameter, it would not be for the benefit of the country that all farm produce should be imported, as that would mean sparse population and slow progress. A few timber-getters would very soon fell the couple of hundred pine trees on an acre of land, and, unless the laws on the subject were very stringent with regard to replanting, a sum of about £200 would represent the whole gain in the time mentioned to a few men, whereas the same area would support a family of agriculturists year after year if it were devoted to agricultural pursuits. In connection with ringbarking, it should be remarked that the operation has a decidedly good effect upon pasture lands by increasing the covering of grass and other herbage, and also by increasing the supply of water on a run.

Springs have been known to break out after the trees have been "ringed," where no spring was formerly suspected. If we consider that a well-grown gum or ironbark will absorb as much as a hogshead of water from the soil, if not more, in twenty-four hours, it may be conceived that the ringing of 100 such trees on an acre must have a beneficial effect upon the subterranean water supply, whatever baleful influence it may exert on the pluvial supply.

With regard to the effect of forest destruction on rainfall, Mr. H. C. Russell, Government Astronomer of New South Wales said (in 1898)—"The destruction of forests in New South Wales from the time that ringbarking was introduced, and for some fifteen or twenty years afterwards, would seem to have been more rapid than the destruction of any other forest in the world, and during that period, the rainfall gradually increased. There is clear proof that the rainfall in this part of the world did not get less as the trees disappeared; and in other countries, where the question has been fully investigated, it has been found that the rain comes, whether there be trees or not."

In a late issue of the "Brisbane Courier," some very pertinent comments on the subject of timber conservation by the Minister for Lands were published, and are well worthy of consideration. The writer of the article stated "that it was more profitable to grow butter and maize than timber, and that, in any case, iron and concrete were making timber unnecessary." On this, Mr. Coyne remarked that these were both the stock arguments of those who wanted to traffic in timber land, and the fallacies of many well-meaning old-timers, before they looked under the surface of things. As a matter of fact, he said, the new industrial uses of wood enormously outnumber the lost uses, and in consequence the demand for timber had increased by leaps and bounds, while the old-timers had been trying to wipe it off the earth. It was quite certain, for instance, that the United Kingdom would import as little wood as possible, and if the theory of substitution were correct, then the use of wood would be declining. The truth was, that the contrary had occurred. The consumption of timber in the United Kingdom, per head of population, was now three times what it was sixty years ago, and mounting costs of coal and labour would so increase the prices of possible wood substitutes that wood must continue in greater demand than ever. During the present war, for instance, prices of general commodities in United States of America increased by 200 per cent. to 300 per cent., but timber advanced only to 150 per cent. of its pre-war value. Timber still remained, and will remain, an elemental necessity of the human race, "from the cradle to the coffin," and no Government could be so wantonly blind as to lean on the broken reed of so utterly discredited a fallacy. Nor could any responsible Government succumb to the wiles of greater profit to such an extent as to convert its pinched timber patches into banana gardens. As a matter of fact, forestry was a safe 10 per cent. compound interest investment, and that was enough for anyone but the profiteer. Ninety-nine per cent. of the land of Queensland was available for ordinary settlement, and only the bare 1 per cent. was left for timber-growing, and most of that consisted of rugged mountain range or barren sands, such as those of Stradbroke and Fraser Islands."

In our next issue we shall deal with the rate of growth of our various timbers, and show what was done in the past in conserving the natural forest trees of Fraser's Island, and in tree-planting on the island.

TO PREVENT IRISH BLIGHT IN POTATOES.

The *Agricultural Gazette*, England, recommends spraying potatoes with 1 per cent. solution of either Burgundy mixture or Bordeaux mixture, to prevent potato blight. The most successful treatment was found to be spraying with a 1 per cent. mixture before any disease appeared, then using a 1½ per cent. mixture in about a fortnight if the disease appears, followed by a 2 per cent. application if the disease becomes persistent. Many English farmers, however, use the 1 per cent. solution all through the season.

Entomology.

INSECT FRIENDS OF THE CANEGROWER.

By EDMUND JARVIS, Assistant State Entomologist.

While ploughing cane land one constantly unearths and exposes to view various forms of insect life, mostly representing different stages of the commoner species of Scarabæidæ, familiarly known as cane beetles.

Throughout summer, autumn, and late spring months the "white-grubs" of these pests are mostly in evidence, while at other seasons living specimens of "greyback" beetles, and the chrysalis stage of this species, are often turned up from depths of 9 to 12 inches.

Although growers, of course, are perfectly aware that all the above-mentioned forms should be destroyed as far as possible, they understand little or nothing about the habits of other soil-frequenting insects often occurring in the furrow, some of which, being parasitic on cane grubs, should be carefully protected.

On several occasions, whilst investigating in the field, information given by the writer has been much appreciated by those who had made a practice of indiscriminately destroying all larvæ whatsoever, in order, as they imagined, to be on the safe side.

It is hoped, therefore, that the following illustrated notes may serve a useful purpose by enabling growers to easily recognise the earlier life-cycle stages of certain useful insects associated with cane grubs.

NOTE.—All figures on the plate represent the natural size of fully-grown specimens. It should be borne in mind, however, that smaller examples of Figs. 1, 4, 7, 9 are often met with in the field, although as regards general appearance, these will resemble the illustrations given.

PARASITIC LARVÆ OF DIGGER WASPS.

Most growers have observed these plump, white, maggot-shaped larvæ, about an inch long, that are often found attached to dead or dying cane grubs. (Fig. 1.)

The life-history of this useful parasite may be briefly outlined as follows:—The female wasp, whilst flying close to the surface of the ground, detects the presence of a suitable grub in the soil below, and having located the exact spot, tunnels at once into the earth to a depth of 6 inches or more until reaching its prey.

A combat ensues, and having by a few judicious stings paralysed the grub and rendered it flaccid and helpless, it glues an egg to its body and returns to the surface to seek additional victims.

Three days later, a tiny maggot breaks the eggshell, and biting a hole through the skin of the host, inserts its head and starts feeding on the juices.

So voracious is its appetite, that in about a week little remains but the empty body, the substance and life of which has been gradually sucked away.

The sleek, well-fed maggot being now fully grown, spins an elongated oval cocoon (Fig. 2) of a dusky reddish-brown colour, inside which it transforms to the pupa or chrysalis stage.

These cocoons are formed of closely woven silk, hardened by the addition of some fluid to the stiffness of ordinary writing paper.

The digger wasp, which emerges about five weeks later—thus completing the life-cycle of about fifty days from egg to perfect insect—leaves the empty cocoon, and tunnelling to the surface, flies off to start grubhunting on its own account.

Our two common digger wasps, named by scientists *Campsomeris tasmaniensis*, Sauss., and *C. radula*, Fab. are known to attack the larvæ of six species of cane beetles; the two favourite hosts, however, being the destructive "greyback" cockchafer (*Lepidiota albohirta*, Water.), and a smaller, very plentiful reddish-brown beetle (*L. frenchi*, Blackb.).

Space forbids detailed description of these wasps, but the size and form of a typical species is shown by Fig. 3.

With regard to general coloration, the body is black, banded behind with bright orange-yellow, while the wings are smoky brown.

PARASITIC LARVÆ OF "ROBBER FLIES."

By referring to Fig. 4, it will be seen that these larvæ, although maggot-shaped, differ from those of digger wasps in being longer, sub-cylindrical, and more slender; and in having the head end provided with a small, blackish beak consisting of two-pointed mandibles.

Living specimens, moreover, instead of appearing translucent and silky-whitish as in *Campsomeris*, are opaque, dull creamy-yellow, and when handled are far more active, being likely, in fact, to prick one with their mandibles whilst attempting to bore downwards.

Unlike the preceding parasite, these larvæ live freely in the soil for months, travelling about if needs be, and when encountering grubs, piercing them and subsisting on the internal juices.

Specimens are occasionally ploughed up while in the act of feeding, the head end at such times being generally buried deeply in the body of the victim.

The egg and early larval habits have not yet been investigated, but the mature larva and the pupa or chrysalis (Figs. 4, 5) both occur freely in cane furrows.

The latter stage, which is dark reddish-brown in colour, may at once be recognised by its curious armature of spines. (Fig. 5.)

The stout, hairy flies that emerge from these pupæ are of predatory habit, fearlessly pouncing upon unoffending insects often larger than themselves. Once clutched by the strong spiny legs, the prey has little chance of escape, and is soon sucked dry by the beaklike mouth of its captor.

Our largest and commonest "robber-fly" (Fig. 6), bred from larvæ found in canefields, is of a general dark brownish-black colour, the body being mostly clothed with white hairs and the legs dusky-red.

PREDACEOUS LARVA OF ELATERID BEETLE.

The species in question is closely related to the well-known "wireworm," which in some districts injures young plant cane.

Growers will have no difficulty in recognising this exceedingly useful larva, a full-grown specimen of which is shown in Fig. 7.

Its smooth, somewhat shining body is pale golden-yellow, shaded into reddish-brown at either extremity.

The head is almost black, and furnished with formidable curved jaws, while the plate-like upper surface of its anal or tail segment terminates in two pointed projections and is edged with stout black teeth.

This larva grows very slowly, living underground for two years or more before transforming to a beetle.

It can travel with great ease through the soil, and in the course of so long an existence, doubtless destroys numerous cane grubs.

The specimen that furnished the illustration was collected in November, 1914, and during a captivity of seven months killed and devoured no less than 126 large grubs and four "greyback" beetles.

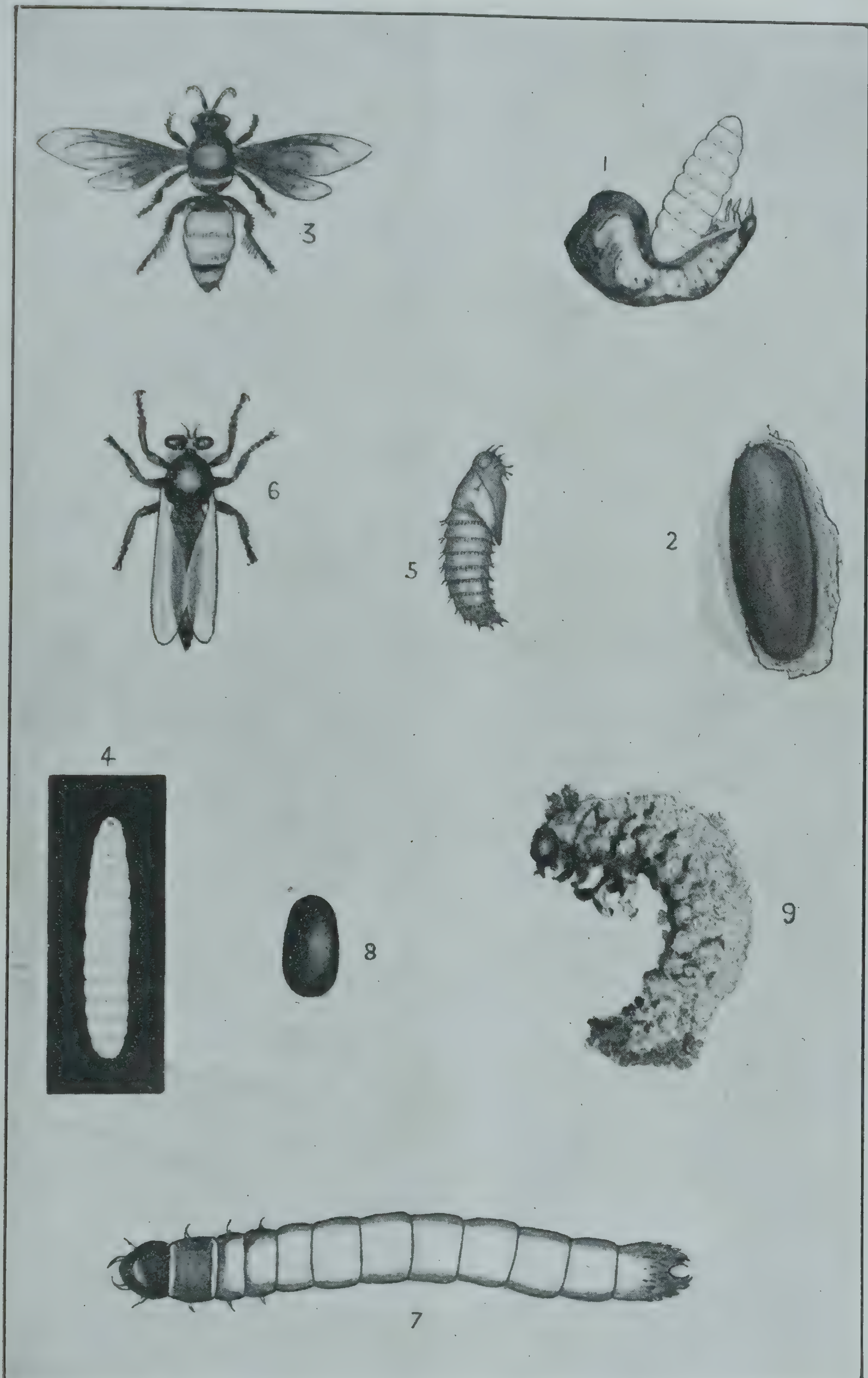
These, however, represented only a portion of the total number of its victims, as, when first obtained, this larva was $2\frac{3}{4}$ inches in length, so had probably been thinning the ranks of the enemy for at least twelve months prior to capture.

Needless to say, these valuable, eminently predaceous larvæ should be most carefully preserved.

It would, indeed, be worth while when noticing specimens in the furrow to stop the plough and cover them with soil to prevent birds from eating them.

The pupal and beetle forms of this insect do not come under the notice of growers, since the former stage occurs at depths below ordinary ploughing, while the perfect insect, which is probably of nocturnal habits, is seldom met with.

It may be of interest to state, however, that this elaterid or "skip-jack" beetle (*Agrypnus mastersi*, Pasc.) is of a uniform polished chestnut-brown colour, and measures about $1\frac{1}{2}$ inches in length.



E. JARVIS, DEL.

PLATE 29.—INSECT FRIENDS OF THE CANEGROWER.

1. Larva of the Digger Wasp.
2. Cocoon of female of same.
3. Digger Wasp (*Campsomeris radula* Fab.)
4. Larva of Robber Fly.
5. Pupa of same.
6. Robber Fly (*Asilus, sp.*)
7. Larva of Elaterid Beetle.
8. Pupa of Dexiid Fly.
9. Cane-grub covered with Green Muscardine Fungus.

(*All drawings original.*)

PUPÆ OF PARASITIC DEXIID FLIES.

These dipterous pupæ, which occur loosely in the soil, are not uncommon in canefields, but being dark and of inconspicuous form, are more noticeable when ploughed up on light-coloured lands.

The maggot lives inside a cane grub until fully grown, and then, crawling just outside the dead body, changes into a reddish-black egg-shaped pupa, not unlike that of a common blowfly, but much larger and plumper in proportion.

It will be seen from Fig. 8 that this pupa differs from a digger wasp cocoon in being smaller, and in having a smooth, hard, somewhat shelly exterior.

Although several species of these parasitic flies, belonging to the family *Dexiidæ*, have been bred by entomologists at different times from various Scarabæid larvæ, little or nothing appears to have been recorded respecting their early life-cycle stages.

At first sight, the perfect insects might readily be mistaken for gigantic blow-flies, but are generally of brighter appearance and are very often adorned with splendid metallic colours.

THE GREEN MUSCARDINE FUNGUS. (*Metarrhizium anisopliæ Metsch., Sor.*)

Most growers are familiar with the appearance of grubs killed by this vegetable parasite, as the body instead of decomposing retains its shape, and gradually hardening, turns at first white and finally an olive-green colour. (Fig. 9.)

The internal organs and fluids of the host are quickly absorbed and replaced by vegetable tissue constituting the rooting portion or mycelium of the fungus, until the entire larva ultimately becomes as firm as a piece of cheese and can be broken into pieces.

The green crust-like covering noticed on affected grubs is in reality the fructification or seeding portion of the fungus, composed of millions of spores, each of which, however, under certain atmospheric conditions, is supposedly able to produce the disease if chancing to find a suitable spot for its development.

The number of spores of *Metarrhizium* fungus occurring on a single insect about one-sixth the size of our common cane grub has been counted by scientists and found to reach the enormous total of 66,400,000.

Specimens attacked by this disease are met with, chiefly during the cooler months, and should always be left in the field and covered over with a few inches of soil.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigation, from the Entomologist, Dr. J. F. Illingworth:—

The continued drought is becoming serious for young cane, though fields which have had frequent cultivation are still in fair condition. Much of the land prepared for late planting will have to stand over, for the season is now too far advanced, even if rains came—except for quick-growing varieties, like H ? 426 ? (Clark's Seedling).

I hoped to be able to give the results of harvesting the Meringa plots in this report, but the work is not half done yet, owing to the unsettled condition of labour. I may say, however, that this cane is cutting out very much better than estimated, and the percentage of c.c.s. is exceptionally good. These results are particularly satisfying, considering that the crop on this land has failed completely in former years—the grubs eating it right out of the ground. Furthermore, with severe drought, such as we have experienced during the past season, it is very difficult to grow a crop on these red volcanic soils. Undoubtedly, our thorough cultivation was one of the most important factors in the control of the grubs. The plots treated with arsenic, however, show remarkable results, which will be more evident when I am able to give the weights of the crops from the various plots.

SUGAR-CANE BEETLE BORER.

This pest is becoming increasingly abundant in certain localities, and its control demands immediate attention. After the cyclone in 1918 there was an abundance of damaged cane, much of which was left on the ground, offering an ideal breeding-place for the multiplication of these beetles. Since that time, we have had frequent calls for assistance from the Babinda and Innisfail districts. While I hope, eventually, to get the Tachinid parasitic flies established in these districts, I must urge immediate concerted action among the farmers of infested areas.

This action should consist of two procedures: (1) thorough burning of all trash throughout the infested area; and (2) planting clean seed. If the trash is burned from the standing cane there is less opportunity for the beetles to escape by flying to nearby fields. Here is an opportunity for associations in infested districts to take a hand, and insist upon a general clean-up; for it is almost useless for an individual, working alone, if his neighbours maintain infested fields.

Let me again call attention to the matter of clean seed. In any case, it is rather dangerous to select plants from an infested field, for it is almost impossible to prevent putting in some of the early stages of the pest—eggs, imbedded in the rind, would certainly be overlooked, and they would hatch just as well after planting. Then, too, if the bags of plants are left in the infested field overnight, they are very attractive to the beetles, which deposit their eggs on the cut surfaces. In one instance, I examined several bags of plants, which had lain on the ground in the field for some time, and found them a writhing mass of borer grubs and frass. I was told that these plants showed no signs of borers when they were placed in the bags. If the use of plants from an infested field is unavoidable, they should at least be removed as soon as cut, so that no beetles have an opportunity to further infest them.

A systematic clean-up throughout the district, leaving no souring cane to assist the beetles in holding over, would do much to eradicate the pest. Then, by using clean seed, the plant-crop, at least, should be fairly free.

PARASITES FOR WHITE GRUBS.

Mr. Frederick Muir, Entomologist of the Hawaiian Sugar Planters' Association, during his recent stay at our station supplied me with considerable information upon this important phase of the problem. As is well known, Mr. Muir has spent many years in extensive travel, collecting and breeding parasites of insect pests of sugar-cane. Consequently, I was gratified to have his cordial interest and advice. He called my attention to the numerous parasites of white grubs in Java, where this pest consists of many species of beetles. I was especially interested to learn that beetles of the genus *Lepidiota*, the same as our cane grubs, are found there; and that they are fairly well controlled by natural enemies. Furthermore, Mr. Muir mentioned two species of bacteria which are apparently very effective there at times.

Since the climate of Java is very similar to our own—the rains coming in the summer time—it would only be natural to conclude that these friendly organisms might be of excellent service if introduced here. Transportation, in this case, would not be difficult, since there is a rather direct line of boats. At any rate, it behoves us to utilise every possible assistance in this tremendous problem. Delay means a loss of many thousands of pounds annually to the industry. Therefore, I would urge the immediate introduction of as many natural enemies as we can secure.

On his return from Bundaberg the General Superintendent of Sugar Experiment Stations stated that the recent rains in that district, while not nearly sufficient, have relieved the country, to a large extent, of its drought-smitten appearance. The young grass was spreading its green carpet in every direction, and the rain has been most beneficial to the young plant cane and that just starting to ratoon. The falls have been somewhat irregular, but nearly every portion of the district has benefited more or less and good rains have also fallen in the Childers district. The rain has greatly cheered the cane farmers, and as the thunderstorm season has now apparently set in, conditions seem promising for further falls. The work at the Experiment Station is in full swing and a large area of cane has been planted, principally new varieties to be tested chemically and in the field. Some very interesting experiments are to be carried out during the coming year, further particulars of which will be found in the forthcoming annual report of the Sugar Experiment Stations. With regard to this year's crushing at Bundaberg, it may be said that it has been a very disappointing one. Qunaba and Gin Gin did not crush at all, and Fairymead, Bingera, and Millaquin had only small crops to deal with. The two former mills have finished crushing and Millaquin anticipates finishing in about a fortnight. Given a good season, it is expected there will be a fair crushing next year, but, owing to drought and scarcity of plants, the area planted is not so large as usual, and what planting will be carried out, now that rain has fallen, will probably not produce enough cane to be cut till 1921.

Botany.

RECORDS OF POISONING OF BIRDS BY TWO SPECIES OF CASSIA.

By C. T. WHITE, Government Botanist.

CASSIA BICAPSULARIS, *L.*

This tropical American shrub is not uncommonly grown in Queensland gardens as an ornamental species and is conspicuous on account of the rather large masses of bright yellow flowers it bears. Some short time ago, Mr. M. J. Colclough brought me specimens for identification, with the record that it was responsible for the deaths of a number of finches in his aviary. Several species of cassia have been accused of poisoning stock in Australia, though—as in the case of the majority of our suspected plants—nothing very definite could be proved against them (and botanists had always great doubt on the poisonous properties of these plants, looking on them as merely possessing purgative properties, like many others of the genus, including the sennas of commerce.

CASSIA SOPHERA, *L.* VAR SCHINIFOLIA, *BENTH.*

This is a native cassia that goes under various local names, such as "yellow pea," "wild senna," and "arsenic bush," the last name denoting that it has previously been suspected of possessing poisonous properties. It has a wide distribution in Queensland and also occurs in New South Wales and in the Northern Territory. J. H. Maiden (*Agricultural Gazette,* N.S.W., Vol. 6, page 241) has recorded it as a bad weed in New South Wales, stating that many people in that State regard it as poisonous to stock, but he also quotes a correspondent as saying: "Sheep will eat the dry seed-pods and seeds, while poultry eat the seeds." So it would seem that any poisonous principle existing in the plant would reside solely in the green shoots.

Recently, when in the Goondiwindi district, the local stock inspector, Mr. P. J. Short, told me that a number of his fowls and a turkey hen had died as the result of picking at the green shoots of this plant, the only green thing in his poultry run.

In the cases here quoted, there seems no doubt that the species of cassia referred to could definitely be blamed as the cause of the deaths of the birds in each; and it would further seem that the fairly numerous charges of stock poisoning made against various species of cassia in Queensland may be more correct than previously imagined. This, however, is a matter that can only be ascertained by future investigations.

HERBGROWING.

We have frequently advised our agricultural readers to take up herbgrowing, even on a small scale. Why should we import practically all the culinary and medicinal herbs, for which there is a large demand? "The Producers' Review" (10th November) writes:—"Practically all the herbs used in cookery in Australia are imported. In their dried form they are worth 1s. 6d. per lb., or £168 per ton. This is quite sufficient evidence that herbgrowing in Australia should be a remunerative occupation." There is no need for a large farm. Three or four acres, including space for a dwelling-house, barn, stable, &c., would be ample for the business. Growers in the Cleveland district are said to be well satisfied with the returns from their herb crops, for which there is a ready market in Queensland.

LONDON QUOTATIONS.

Cotton, 23.49d. per lb; rubber (Para), 30d. per lb.; linseed oil, 92s. per cwt.; cotton seed oil, £55 per ton; coconut oil, £59 per ton; Mexican sisal hemp, £60 per ton; Mauritius hemp, £55 per ton; Manila hemp, £51 per ton.

General Notes.

THE NATIONAL ASSOCIATION.

The proposal of some stock-breeders to change the month of the National Exhibition from August to May has its pros and cons. Both dates have been criticised, and Mr. J. Bain, Secretary of the Association, has replied to the advocates of the month of May as follows:—

"In connection with the above matter, it is illuminating to note that the date of holding the Melbourne Show is parallel in seasonal conditions with our own, August in Brisbane and September in Melbourne, being practically the beginning of Spring.

"Under these circumstances, and in view of the knowledge that an agitation was in progress for changing the Brisbane Show dates, it was very interesting to hear during my recent visit to Melbourne the expressions of opinion from Victorian exhibitors. Cattle breeders admitted that May would suit the selling exhibitor better than September, but it had to be borne in mind that there were a great many more buyers than sellers.

"Buyers were emphatically in favour of a September show.

"'It has to be remembered,' said one exhibitor, 'that a show is not composed of cattle only. As a sheep man, I am opposed to any change of date.' Horse exhibitors to whom we spoke were equally opposed to a change from September.

"I feel that it would be a very unwise action on the part of the National Association to make any change at present. We have no knowledge that the majority of breeders are in favour of the change, rather is the argument the other way, for a very large number of breeders have been circularised in this matter asking for expressions of opinion, but notwithstanding this very extensive correspondence, according to the list which you give, only twenty-four have replied in favour of May, and analysis of the names show that ten of the twenty-four are not exhibitors at our Show, and six are not even members.

"It would appear from this that the majority of the 219 cattle exhibitors at our last Show are so utterly indifferent that they have not taken the trouble to reply.

"Until overwhelming arguments in favour of a change can be submitted, this Association would be ill-advised to make any change.

"In conclusion, I might mention that one of the most prominent cattle-breeders in Queensland ridicules the change, asserting that the Brisbane Show has got beyond the days of grass-fed stock, whilst another, possibly one of the biggest sheep-breeders we have in the State, writes:—

"'From a cattle point of view alone the change would have certain advantages, but I view it that such an Association as yours has to view the matter generally . . . . It would have too big an effect upon the Brisbane ram sales, which are coming more to the fore. These sales would not be a success if held at any other time than the Show week.'"

PEANUT OIL AND FLOUR.

Beside the great value of the peanut as an oil-producer, the residue after extraction of the oil takes the form of a cake of a definite standard of purity, enabling the flour to be used as a nourishing and palatable food for human beings. On this subject, "Tropical Life" (Ceylon), for September, 1919, has an article from the *Agricultural News*, Vol. xviii., No. 444, on "Nutamine," as this groundnut cake has been designated, and in which the methods employed in preparing this article are described as follows:—

"In order to 'pick over' the nuts more satisfactorily and effectively, it is suggested that they be cleaned on a mechanical washer, and then thoroughly dried in a mechanical drier. After this, the inner red skin is removed by means of a blast of hot air playing on the seeds while they are being whirled round in a large drum. In this way the seeds are dried, cracked, and the red skin blown away. By this method the preliminary drying of the seeds is avoided, and the cleaned seeds are left practically free of their red skin, and ready for oil expressing. To obtain good,

clear oil and good cake, hydraulic presses are used, and the expression should always be carried out cold, as the resulting cold-drawn oil is nearly colourless, has a pleasant taste and odour, and can be used as a substitute for olive oil. Such oil also keeps remarkably well.

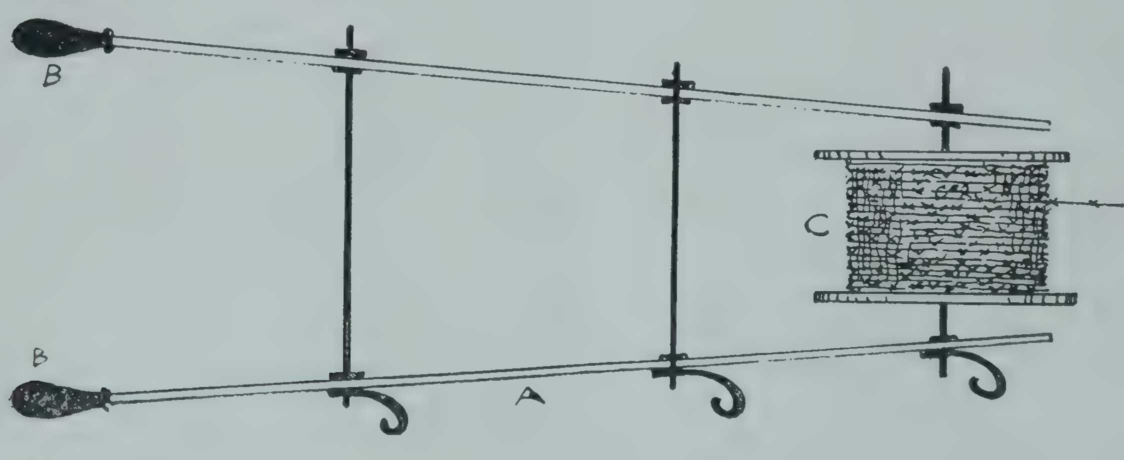
"The resulting cake, however, still contains between 10 to 15 per cent. of oil, and this is too much for the production of 'nutamine.' The cake must be subjected to a second expression, being warmed this time. The resulting oil, of an inferior grade, is widely used in soapmaking, and the cake left after this second pressure should contain about 5 per cent. of oil, the standard aimed at. This cake, when finely ground in an ordinary roller mill, and subsequently passed through a sieve, is the preparation known as 'nutamine.'

"From this fine flour thus obtained, biscuits and many other articles for human consumption can be made, for if the oil has been properly removed, the flour has quite a pleasant taste, and possesses a high protein content. Being deficient in carbohydrates, the flour should be ordinarily mixed with a proportion of wheat flour, and this gives a highly nutritious mixture, and supplies a concentrated and economical food. Bread and biscuits made from the following recipe are said to keep well, and to possess a pleasant taste, the dried milk adding to the food value. Groundnut flour, 84 parts; dried milk, 14 parts; sodium bicarbonate, 2 parts. Biscuits made from such a mixture are reported to be light, and to keep well in a tin. It would appear, however, that should anyone in these islands desire to make experiments with biscuits from groundnut flour, the quantity of fresh milk needed to moisten the flour could well take the place of the dried milk in the recipe given above.

"It is stated that whilst wheat, oats, and several other cereals are markedly deficient in the so-called basic aminoacids, groundnut cake and flour contain a large amount of these. Hence the reason for the designation 'nutamine.' "

RUNNING OUT BARBED WIRE.

Mr. W. Taylor, Mitchell, writing on this subject, as dealt with in the October issue of this journal, says that his method is handier. His plan is to get two side sticks 6 ft. long, and three cross sticks, 2 ft. long. Bore three 1-in. holes in each side stick, and point the cross sticks to fit the holes. Drive them in and fasten, leaving one side loose to put the coil of wire on. Use three wire pins to hold it loosely. Put on the coil of wire and start away. The side sticks prevent the coil falling off. This constitutes, in fact, a skeleton wheelbarrow.



Answers to Correspondents.

CANARY BREEDING.

A beginner in breeding canaries asks for information concerning the pairing of the birds, and the length of time elapsing before the eggs are hatched.

A writer on this subject says:—I breed canaries and will tell you how to do it:—

In June and July start getting your cages, nests, &c., all ready, leaving nothing till the last minute; and the last week in July, or the first week in August, put the birds together. Some very successful breeders pair their birds at the end of June, or beginning of July. The hen generally lays the first egg eight or nine days after being paired. It is best to take the first two eggs away the morning they are laid, and return them the morning the third egg is laid. By taking the eggs away the young are all hatched about the same time, and get much better fed. Always use a spoon in removing the eggs, as the fingers might break them. The eggs should be hatched thirteen days after you have returned them. Always keep a bit of cuttlefish hung up in the cage—it keeps the hen from being egg-bound. Leave the young birds with the old ones as long as you possibly can. When they annoy or worry the hen, or the old bird starts plucking them, put them in the division specially made for that purpose in the cage, or else put them in a weaning cage hung on the front of the breeding cage, and the old birds will feed them through the bars. It is not desirable to let the hens have more than three nests in a season. If you do, the following season the hens that have more than three nests will have very weak young birds. During breeding time, give both the old and young birds egg, mixed with Eastway's Canary Food. The best way to mix it is as follows:—Boil the egg for 12 minutes, and then take the yolk only and mix it (using the back of a fork) with three tablespoonfuls of Eastway's Canary Food. This would be enough for six birds for one day. Give your birds plenty of green food—watercress is best. It is a pleasure for the hen to feed her young when she can get watercress. Give the birds plenty of fresh water to bathe in during breeding time.

A MILK TEST.

W. Cox, Hawthorne—

In the sample of milk forwarded by you to this office, a good deal of butter-fat had risen to the surface during transit, and Mr. Graham, Chief Dairy Expert, said that it was impossible, consequently, to carry out a reliable test. For your information, he states that the following test is recognised by many as being very reliable:—

Immediately after the milk has settled down after being drawn from the cow, take a glass of clean rain water, and when the water is perfectly still in the glass, insert a clean knitting needle into the milk. Upon withdrawing same a drop or more of milk will be found adhering to the needle. Allow one drop of milk from the needle to fall steadily into the water in the glass. In cases where the cow is in calf, the bead of milk will be carried almost, if not quite, to the bottom of the glass before it loses its spherical shape, and becomes diffused amongst the water. In cases where the animal is not in calf the drop of milk will become diffused with the water as soon as the two fluids meet.

Naturally, there are many factors which may interfere with the reliableness of a test of this nature, but, in the majority of cases, the test can be taken as a fairly accurate guide.

FEEDING PIGS.

A correspondent asks how it would do to let pigs run in a paddock under Rhodes grass, and feed maize to them in addition.

For the purpose of raising pigs, this method of feeding may be tolerably successful, but when applied to the fattening of the animals the result would scarcely be satisfactory, unless a comparatively large proportion of maize is fed,

the reason being that the pig is not capable of the digesting of anything like the complement of Rhodes grass which is necessary in order to supply the amount of nutriments requisite for the pig while fattening. For utilisation in connection with the fattening of pigs for market, Rhodes grass is not the equal of lucerne as mentioned. Further, the palatability of Rhodes grass has to be considered, as it is doubtful whether swine will partake extensively of Rhodes grass, especially when a liberal supply of maize is fed in conjunction with it. In such cases it is probable that the pigs will eat comparatively less of the Rhodes grass and rely more fully upon the available maize for their sustenance; and, in the event of this happening, the suggestion to utilise Rhodes grass to a fairly full degree in the fattening of pigs would be defeated.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER, 1919, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER, 1919 AND 1918, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1919.	Oct., 1918.
North Coast.	In.		In.	In.
Atherton	0·90	18	0·43	0·25
Cairns	2·03	37	0·18	0·15
Cardwell	1·97	47	0·06	0·14
Cooktown	1·15	43	0·15	Nil
Herberton	0·92	32	0·06	0·20
Ingham	1·54	27	Nil	1·24
Innisfail	3·05	38	0·22	0·96
Mossman	3·46	11	0·14	0·34
Townsville	1·21	48	Nil	Nil
Central Coast.				
Ayr	0·90	32	0·01	0·02
Bowen	1·05	48	Nil	Nil
Charters Towers ...	0·67	37	Nil	0·06
Mackay	1·89	48	0·06	Nil
Proserpine	1·80	16	0·12	0·52
St. Lawrence ...	1·87	48	0·42	0·15
South Coast.				
Biggenden	2·24	20	0·65	0·63
Bundaberg	2·14	36	2·28	0·04
Brisbane	2·65	68	0·86	1·14
Childers	2·14	24	4·71	0·10
Crohamhurst ...	3·57	25	0·71	0·80
Esk	2·41	32	1·15	0·92
Gayndah	2·41	48	1·42	0·36
Gympie	2·73	49	2·16	0·99
Glasshouse M'tains	2·87	11	0·71	0·33
Kilkivan	2·69	40	1·34	0·21
Maryborough ...	2·74	48	2·92	0·55
South Coast—continued:	In.		In.	In.
Nambour	3·14	23	0·51	0·42
Nanango	2·38	37	0·73	1·02
Rockhampton ...	1·80	32	1·58	0·01
Woodford	2·68	32	1·06	1·00
Darling Downs.				
Dalby	2·14	49	0·87	1·51
Emu Vale	2·40	23	0·54	1·06
Jimbour	1·91	31	0·36	1·59
Miles	2·02	34	0·17	0·88
Stanthorpe ...	2·65	46	0·69	1·24
Toowoomba ...	2·71	47	0·50	1·78
Warwick	2·30	32	0·38	0·87
Maranoa.				
Roma	1·74	45	0·09	1·11
State Farms, &c.				
Bungeworgorai ...	1·22	5	0·06	0·84
Gatton College ...	2·33	20	0·66	0·68
Gindie			Nil	0·04
Hermitage ...	1·99	13	0·51	0·98
Kairi	1·24	5	Nil	0·67
Sugar Experiment Station, Mackay	1·77	22	0·01	Nil
Warren	2·34	5	2·48	Nil

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year, and for the same period of 1918, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR NOVEMBER, 1919.

Article.		NOVEMBER. Prices.
Bacon	lb.	11½d.
Barley	bush.	5s. 3d. to 5s. 6d.
Bran	ton	£9 15s.
Broom Millet	,,	£45
Broom Millet (Sydney)	,,	£60 to £70
Butter (First Grade)	cwt.	188s. 4d.
Chaff, Canary Straw	ton	...
Chaff, Lucerne	,,	£13 10s. to £22 5s.
Chaff, Mixed	,,	£15 5s.
Chaff, Oaten	,,	£14 to £15 6s.
Chaff, Wheaten	,,	£12 to £15
Cheese	lb.	11d.
Flour	ton	£14 10s.
Hams	lb.	1s. 10d.
Hay, Lucerne	ton	£8
Hay, Oaten	,,	£15 10s.
Hay, Wheaten	,,	...
Honey	lb.	5½d. to 7d.
Maize	bush.	8s. 1d. to 8s. 9½d.
Oats	,,	6s. 2d.
Onions	ton	£19 to £20
Peanuts	lb.	6d. to 9d.
Pollard	ton	£10 5s.
Potatoes	,,	£34 5s. to £40
Potatoes (Sweet), per sugar-bag	...	5s. 6d. to 8s. 6d.
Pumpkins (Cattle)	ton	£8 to £11 10s.
Sugar-cane	,,	...
Turnips (Swede)	cwt.	11s. 6d.
Eggs	doz.	1s. 2d. to 1s. 5d.
Fowls	per pair	5s. 5d. to 10s. 6d.
Ducks, English	,,	5s. to 6s. 6d.
Ducks, Muscovy	,,	8s. to 11s.
Geese	,,	9s. to 12s.
Sucking Pigs, per pair	,,	19s. to 22s. 6d.
Turkeys (Hens)	,,	10s. to 17s.
Turkeys (Gobblers)	,,	40s. to 49s.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per dozen bundles	6s. to 15s. 6d.
Beans, per sugar-bag	8s. to 15s.
Beetroot, per dozen bunches	1s. to 1s. 6d.
Cabbages, per dozen	4s. 6d. to 25s.
Carrots, per dozen bunches	9d. to 1s.
Cauliflowers, per dozen	...
Celery, per bundle	2s. 6d. to 2s. 9d.
Cucumbers, per dozen	6d. to 2s. 6d.
Lettuce, per dozen	6d. to 1s.
Marrows, per dozen	3s. to 11s.
Peas, per sugar-bag	10s. to 14s.
Potatoes (Sweet), per sugar-bag	5s. 6d. to 10s.
Pumpkins (table), per sack	10s. to 12s.
Tomatoes, per quarter-case	8s. to 15s.
Turnips, per doz. bunches	3s. to 4s.
Turnips (Swede), per sugar-bag	11s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	November. Prices.
Bananas (Queensland), per case	22s. to 30s.
Bananas (Tweed River), per case	24s. to 31s.
Bananas (Fiji), per case	...
Cherries, per half-case	12s. to 16s.
Lemons, per bushel-case	14s. to 17s.
Mandarins, per case	12s. to 22s.
Oranges, per bushel-case	15s. to 16s.
Oranges (Navel), per bushel-case	22s. to 25s.
Passion Fruit, per double-case	22s.
Pineapples (Queens), per double-case	18s. to 20s.
Pineapples (Ripleys), per double-case	12s. to 20s.
Pineapples (Common), per double-case	10s. to 15s.
Strawberries (Queensland), per tray	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel-case	15s. to 23s.
Apples, Cooking, per bushel-case	16s. to 17s.
Apricots, per half-case	12s. 6d. to 15s.
Bananas (Cavendish), per dozen	2d. to 10½d.
Bananas (Sugar), per dozen	3½d. to 8d.
Cape Gooseberries, per quart	10d. to 11½d.
Cherries, per tray	10s. to 12s. 6d.
Citrons, per cwt.	9s. to 14s.
Cocoanuts, per sack	15s. to 25s.
Custard Apples, per quarter-case	...
Lemons (Lisbon), per half-case	11s. to 22s.
Lemons (Rough), per cwt.	14s.
Mandarins, per case	...
Mangoes, per case	4s. to 8s. 6d.
Oranges (Seville), per cwt.	17s.
Oranges (Navel), per case	14s. to 18s.
Oranges (Other), per case	8s. to 25s.
Papaw Apples, per quarter-case	2s. 5d. to 3s. 6d.
Passion Fruit, per half-bushel case	11s. to 15s.
Pineapples (Rough—green to ripe), per case	4s. to 9s. to 16s.
Pineapples (Smooth), per case	10s. to 15s.
Pineapples (Ripley), per dozen	8s. to 16s.
Strawberries, per dozen boxes	8s. to 20s.
Tomatoes (prime), per quarter-case	10s. to 14s.
Tomatoes (inferior), per quarter-case	3s. to 7s.

TOP PRICES, ENOGGERA YARDS, OCTOBER, 1919.

Animal.	October. Prices.
Bullocks	£29 to £30
Cows	£18 15s. to £20 2s. 6d.
Merino Wethers	44s.
Crossbred Wethers	44s.
Merino Ewes	27s. 3d.
Crossbred Ewes	45s.
Lambs	41s.
Pigs (Bacon)	£5 11s.
Pigs (Porkers)	£2 10s.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Prick them out into beds or boxes or very little soil containing plenty of leaf mould. Then keep a sharp lookout for slugs and caterpillars. Keep a supply of tobacco dust on hand, and scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubbery plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Foxhunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight, and will afford light and profitable work for girls with spare time on their hands.

An exhaustive booklet on "Flower Gardening for Amateurs" has been issued by the Department of Agriculture and Stock, and may be obtained from the Office. Price, 2s.

Another useful publication is "Market Gardening in Queensland." Price, 1s., also issued by the Department. The sixth edition being exhausted, the seventh and revised edition will shortly be ready for issue.

Orchard Notes for January.

THE SOUTHERN COAST DISTRICTS.

The fruit of the month in this part of the State is the grape, and its gathering and marketing will occupy the attention of growers. Care should be taken to cut the fruit when cool and dry, and if it has to be sent any distance the stems of the bunches should be allowed to wilt before the fruit is packed, as the berries will then hang on to the bunch better, and the bunch carry in better order. Select the fruit carefully, grade it, and pack firmly so that it will not bruise in transit. If to be sent long distances, pack in crates holding from four to six 6-lb. baskets. Pines will be ripening in quantity towards the end of the month. Gather before fully coloured, and, whether for Southern or local markets, pack and handle carefully to prevent bruising. Do not ship the fruit too green for the Southern markets, as doing so is apt to spoil the trade. Send good fruit to the canneries. Small pines and crippled fruit are no good to canners, and the sooner our growers realise that it only pays to grow good fruit the better for them and for the canners, for if the latter cannot get good fruit, it is impossible for them to put a line of goods on the market that will not only be a credit to the State, but for which a world-wide market can be obtained.

Passion fruit should not be allowed to lie about for days on the ground before gathering, as, if so, they are apt to become fly-infested.

Watermelons and rockmelons are still in season.

Watch any late peaches, Japanese plums, or other fruits liable to be infested with fruit-fly, and gather and destroy all infested fruit, or, better still, grub the trees out and burn them as they only breed flies to destroy more valuable fruit. Mangoes will be ripening during the month. See that all fly-infested fruits are destroyed, as they will only breed up further crops to destroy later ripening fruits.

Citrus orchards can be cyanided during the month for scale insects, and spraying for Maori with the sulphide of soda wash should be continued where necessary.

Mangoes can be budded during the month, as well as citrus and deciduous trees. Tropical fruit trees can be transplanted, taking care to choose dull weather and to cover same from the direct rays of the sun till they have become firmly established. Pines and bananas can still be planted.

THE TROPICAL COAST DISTRICTS.

Mangoes will be going off. See that they are not allowed to remain about on the ground to breed flies for the autumn crop of oranges. Longan, litchi, and other fruit are in season. As the month is often a very wet one, little cultivation can be done in the orchards. Strong undergrowth should, however, be kept down with a hoe or scythe. Tropical fruits of all sorts can be planted. Look out for Maori on citrus fruits, and spray when necessary.

THE SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Stanthorpe district, apples, pears, plums, peaches, and nectarines being in season. Do not gather the fruit too immature; at the same time, don't allow it to be over-ripe. Gather dry, handle carefully, grade and pack in attractive cases. Keep the fruit as cool as possible, and ship in well-ventilated cars. Keep a sharp lookout for fruit-fly, and take every possible means to prevent its spreading, even going as far as to gather and destroy the whole of the fruit on any infected trees, for if kept in check during the month, the bulk of the fruit ripening during February will be free.

Keep a sharp lookout also for codling moth; examine the bandages on the trees at least every ten days, and destroy all larvæ found therein; also gather and destroy all moth-infected fruit.

Gather Bartlett pears as soon as they are large enough, and store away in a cool shed to ripen; when they show signs of ripening, market, not before. If sent down green they will sell for cooking, and only fetch a small price. The right stage at which to gather is when the fruit is fully developed, and the flesh has lost its woody flavour, but is still quite hard. This is usually before the fly has stung it, and if gathered at this stage the fruit will ripen up properly without shrivelling, and develop its full flavour.

These remarks apply also to the Downs country, which is somewhat earlier than Stanthorpe.

The crop of the month in the Western tablelands is the grape; and the remarks I have made respecting this fruit when grown in the Southern Coast districts apply equally here. The fruit should be gathered dry, and wilted before it is packed. Too large cases are often used; cases holding from 20 to 30 lb., or crates holding six 6-lb. baskets, are preferable, the latter being the best package for shipping the fruit long distances. Keep the orchards well cultivated, and, where water for irrigation is available, give citrus trees a watering during the month, unless there has been a sufficient rainfall. When the orchard is irrigated, see that thorough cultivation follows the irrigation, so as to conserve the moisture in the soil.

Red scale, which is prevalent on citrus trees in the dry Western country, should be treated during the month. Cyaniding is the best remedy.

THE ATHERTON BUTTER FACTORY COMPANY.

Some interesting particulars of the operations of the above company were supplied in a report presented by the manager on 22nd July, and although somewhat belated for this month's issue of the "Q.A. Journal," the information supplied will doubtless prove of interest to many of our readers. The report showed that from 305 suppliers there were received 5,120 cans containing 237,034 lb. cream, from which were manufactured 52 tons 2 cwt. 2 qr. 10 lb. butter, being a decrease of approximately 3½ tons on the previous month. The corresponding period for last year shows a manufacture of 42 tons, which means this year's increase for June is 10 tons. Price: The price of butter still remains the same, at 1s. 7d. per lb. wholesale, but there is every likelihood of an increase in the near future, as advised by Southern butter experts. The Malanda branch has started pasteurising. The Cairns milk vendor, Mr. Harris, informed the company that he had arranged for an immediate supply from Malanda dairymen of about 60 gallons. The dairy inspector paid a visit to the Atherton factory during the month, in conjunction with the chairman, and was quite satisfied with the cleanliness and general appearance of same. It was resolved that Mr. Hamilton, formerly buttermaker, be re-employed in the factory as foreman and buttermaker; also that the foreman at each factory should present at each monthly meeting a report of the running of his factory during the previous month; also that there be tabled with the manager's financial statement figures showing the comparative running costs of each factory, for statistical purposes. Discussion took place concerning charges for cold storage required in Cairns, and it was resolved that the company's representatives should pay not more than the expected rate for one room, or a reasonable amount per box. It was agreed that estimates be obtained as to the cost of pumping buttermilk direct to Mr. J. P. Leinster's piggery. Mr. McWhinney, of the Farmers' Co-operative Distributing Company, was appointed to represent the company at the intended conference to discuss Mr. Massy Greene's scheme for organising the butter industry of the Commonwealth. Regret was expressed that owing to distance the company would not be able to send its own delegates. The report was unanimously adopted.

OLD NUMBERS OF THE JOURNAL.

The Department has on hand a number of the earlier issues of the *Queensland Agricultural Journal;* and, if any of our readers would like to have a few copies of these old issues, same will be supplied free of any charge. If, however, *any particular numbers are specified,* and they are available, a charge of 6d. each will be made.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	September.		October.		November.		December.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·30	5·47	4·59	6 4	4·46	6·27
2	6·2	5·34	5·29	5·48	4·59	6·5	4·46	6·28
3	6·1	5·34	5·28	5·48	4·58	6 6	4·46	6·29
4	6·0	5·35	5·27	5·49	4·57	6·7	4·46	6·30
5	5 59	5·35	5·26	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·25	5·50	4·55	6·8	4·46	6·32
7	5 57	5·36	5·24	5·50	4·55	6·9	4·46	6·32
8	5 56	5·37	5·23	5·51	4 54	6·9	4·46	6·33
9	5 55	5·37	5·22	5·51	4·53	6·10	4 47	6·33
10	5·54	5·38	5·21	5·52	4·53	6·11	4·47	6·34
11	5 53	5·38	5·19	5·52	4·52	6·11	4·47	6·35
12	5 51	5·38	5·18	5·53	4·52	6·12	4·47	6·36
13	5·50	5·38	5·17	5 53	4·52	6·13	4·47	6·36
14	5·49	5·39	5·16	5·54	4·51	6·14	4·48	6 37
15	5·48	5·39	5·15	5·54	4·51	6·14	4·48	6 37
16	5·47	5·40	5·14	5·55	4·51	6·15	4 48	6·38
17	5·46	5·40	5·13	5·55	4 50	6·15	4·49	6·38
18	5·45	5 41	5·12	5·56	4·50	6·16	4·49	6·39
19	5·44	5·41	5·11	5·56	4·49	6·17	4·49	6·39
20	5·43	5·42	5·10	5 57	4 49	6·18	4·50	6·40
21	5·41	5·42	5·9	5·57	4·48	6 19	4·50	6·40
22	5·40	5·43	5·8	5·58	4·48	6·20	4·51	6 41
23	5·39	5·43	5·7	5·58	4·47	6·21	4·51	6·41
24	5·38	5·44	5·6	5 59	4·47	6 22	4 52	6·42
25	5 37	5·44	5·5	5·59	4·47	6·23	4·52	6·42
26	5·35	5·45	5·4	6·0	4·47	6·24	4·53	6·43
27	5·34	5·45	5·3	6·1	4·46	6·25	4·53	6·43
28	5·33	5·46	5·2	6 2	4·46	6·26	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4 54	6·44
30	5·31	5·47	5 0	6 3	4·46	6·27	4·55	6·45
31	...	...	5·0	6·4	...	...	4·56	6·45

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania, unless "summer time" is adopted.

			H. M.
3 Sept.	(	First Quarter	12 [illegible]
10 ,,	○	Full Moon	1 [illegible]
17 ,,	)	Last Quarter	7 [illegible]
24 ,,	●	New Moon	2 34 [illegible]

The Moon will be in Perigee on 13th at 6 6 p.m., and in Apogee on the 29th at 3·30 p.m.

2 Oct.	(	First Quarter	6 37 p.m.
9 ,,	○	Full Moon	11 39 p.m.
16 ,,	)	Last Quarter	3 5 p.m.
24 ,,	●	New Moon	6 40 a.m.

The Moon will be in Perigee on 11th at 2·54 p.m., and in Apogee on the 27th at 6·42 a.m.

1 Nov.	(	First Quarter	11 43 a.m.
8 ,,	○	Full Moon	8 35 a.m.
15 ,,	)	Last Quarter	1 41 a.m.
23 ,,	●	New Moon	1 20 a.m.

The Moon will be in Perigee on 8th at 11·54 p.m., and in Apogee on the 23rd at 12·24 p.m.

1 Dec.	(	First Quarter	2 47 a.m.
7 ,,	○	Full Moon	8 4 p.m.
14 ,,	)	Last Quarter	4 2 p.m.
22 ,,	●	New Moon	8 55 p.m.
30 ,,	(	First Quarter	3 25 p.m.

The Moon will be in Perigee on 7th at 12·48 p.m., and in Apogee on the 20th at 1·36 p.m.

The Moon will cause an annular eclipse of the Sun on Nov. 23rd, but it will not be visible in Australia. There will also be a partial eclipse of the Moon on Nov. 8th which will be visible in England but not in Australia.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets and the moonlight then extends all through the night, when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.